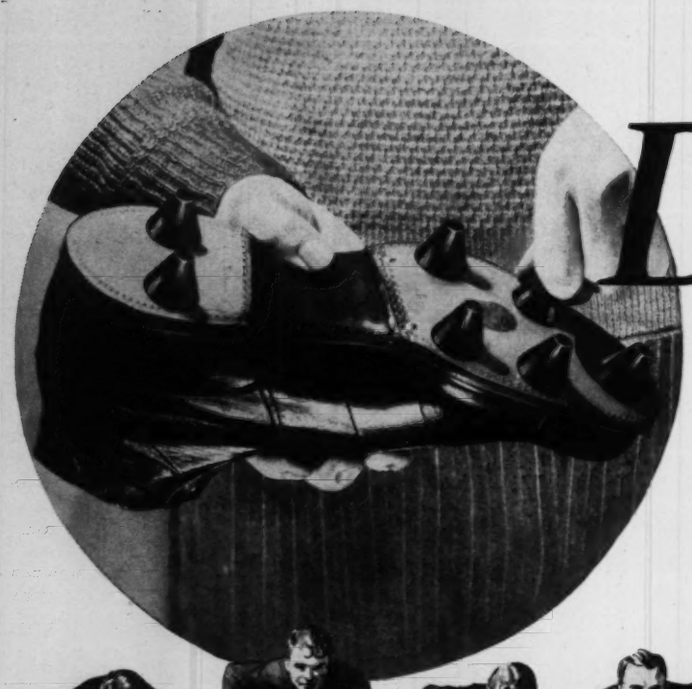
SCHOLASTIC COACH

Left: Keith Brown of Yale setting the world's indoor pole vault record of 14 ft. 4 in. in Madison Square Garden, Feb. 17, 1934. This is within ⅜-inch of the world's outdoor record set by Wm. Graber. Unlike Graber, Brown relies less on speed down the runway, more on "double action" in the air—body jack-knife, apparent hesitation, then forceful arm push-away from the pole. Graber relies more on his upward shoot off the ground from the momentum of his faster run. He hardly pushes off from the pole at all in clearing, but seems to fly away from it.

Right: Walter Marty of Fresno State Teachers College, holder of the world's outdoor record of 6 ft. 8 in., set a new indoor record and new all-time high of 6 ft. 8¾ in. in the same meet in which Brown (above) vaulted to a new indoor record. Marty, a Western-roller, approaches the bar from the right at a 45° angle. Another great Western-roller, Harold Osborn, approached from the left, rolled more than does Marty whose bar-clearance depends more on a quick lift of his posterior with the hips coming up suddenly, levelling off the back directly over the bar.

MARCH 1934 25c



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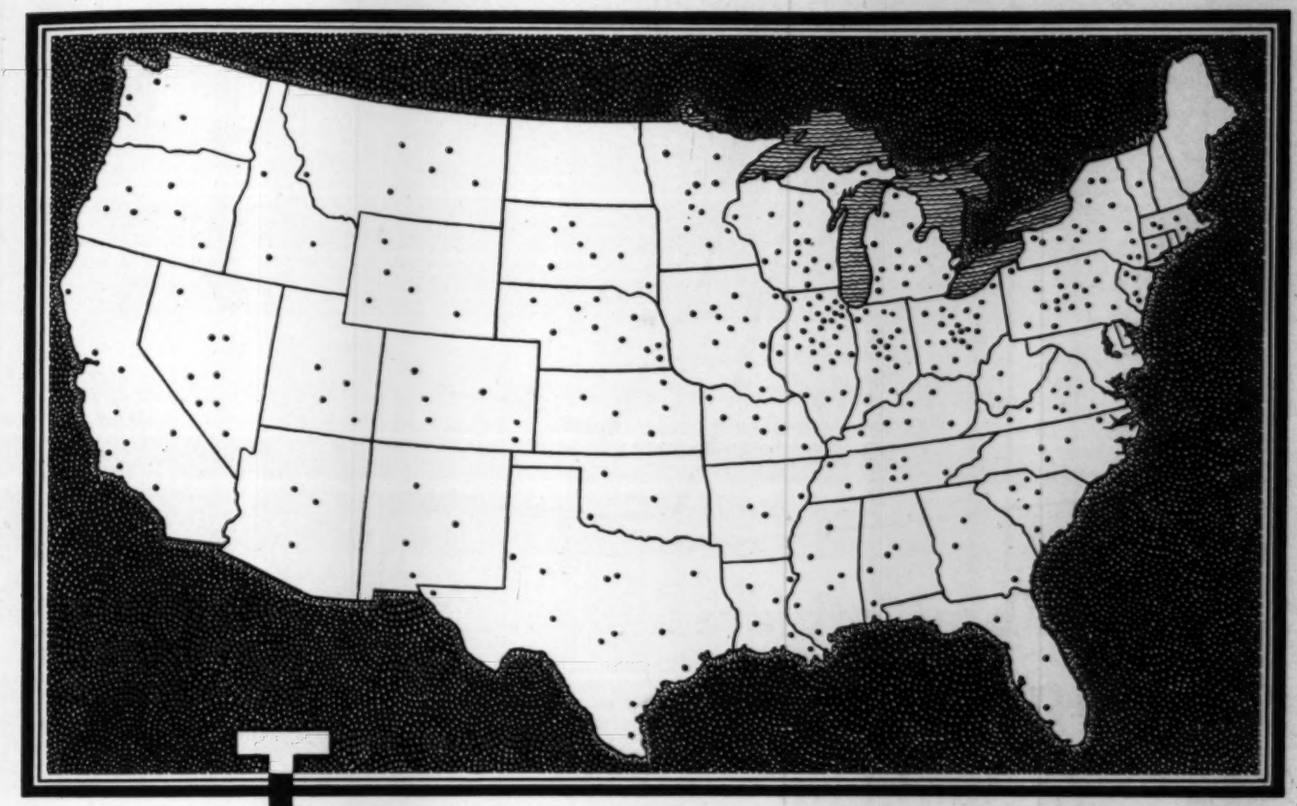

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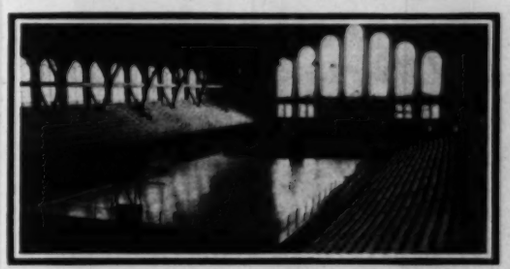

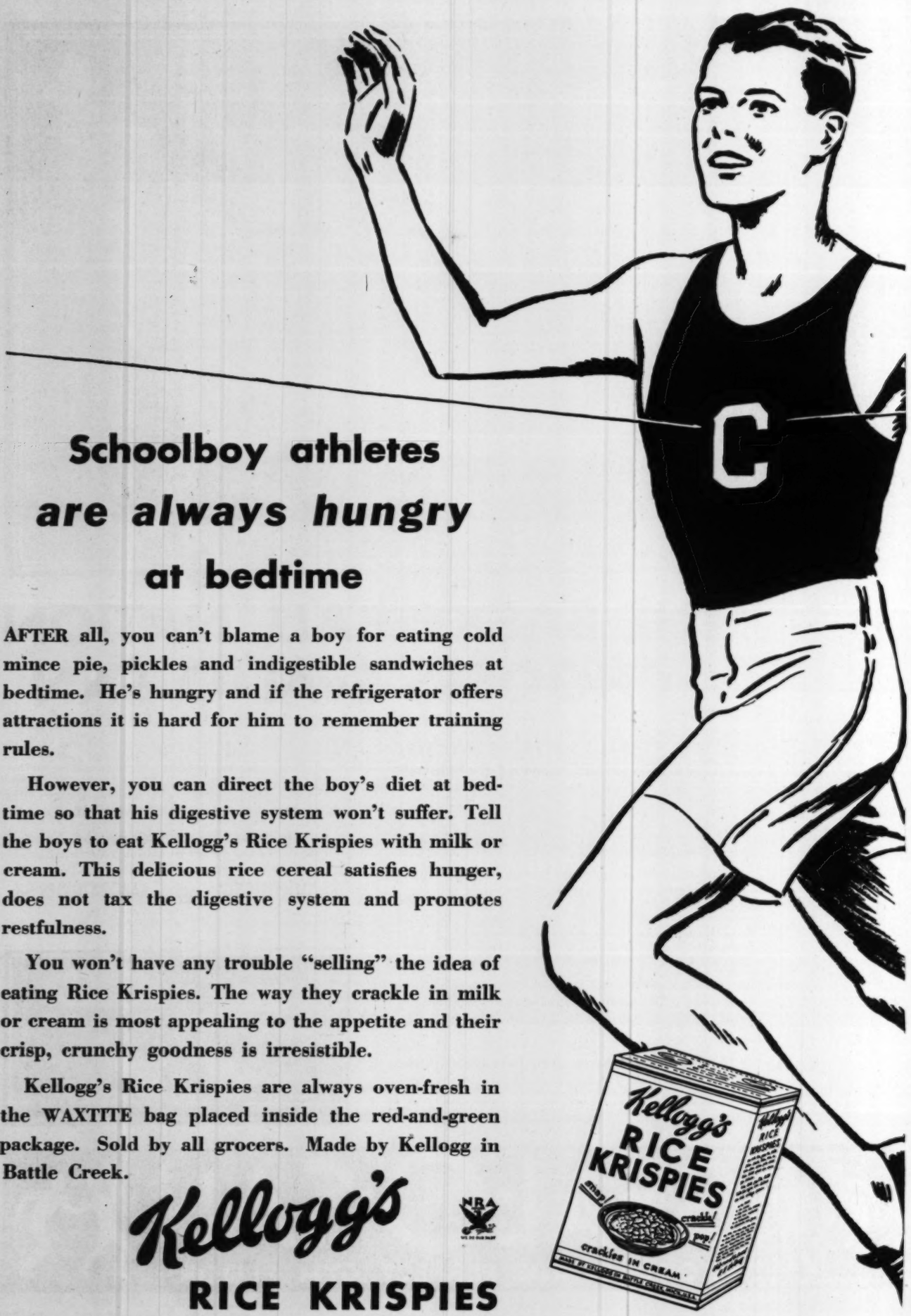

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IN THIS ISSUE

JACK LIPPERT, Editor

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5. Keep happy and contented by varying your work.
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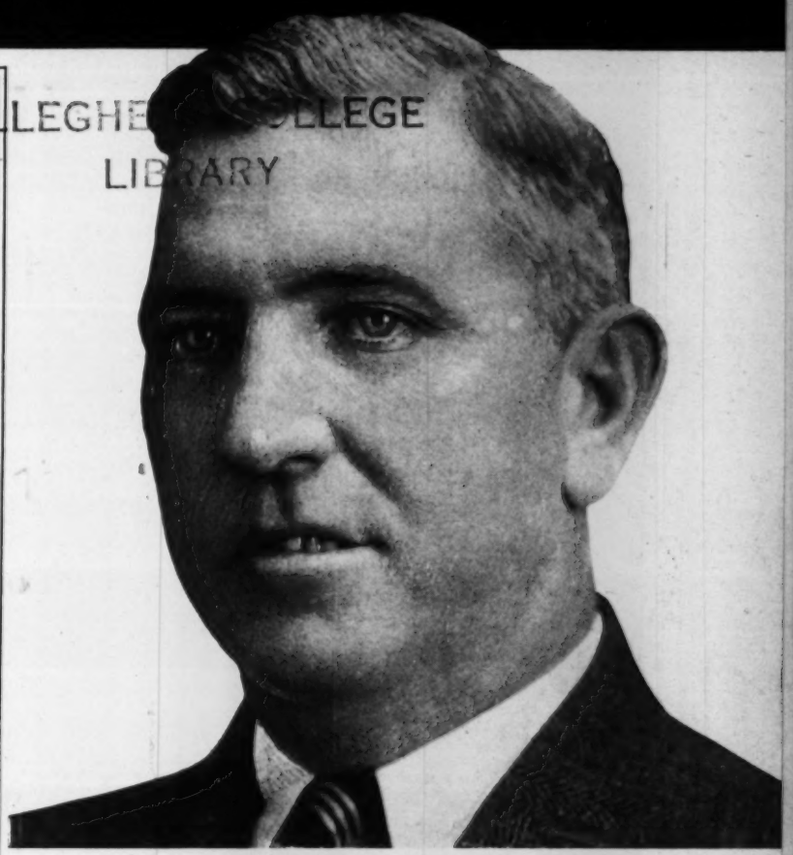
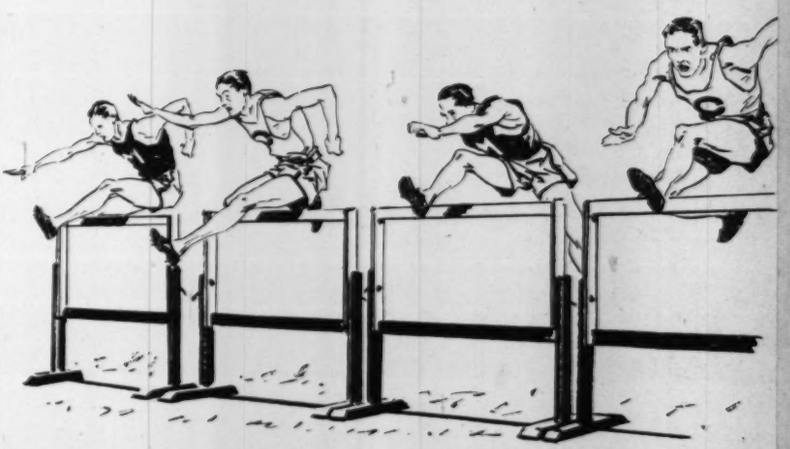
7. Relieve sore muscles by frequent rubs with reliable preparations.
8. An athlete wins on his feet. Watch your footgear, take care of bruises and blisters, bathe your feet regularly.
9. Start the day with a warm shower, followed by cold, and a brisk rub-down with a coarse towel.
10. Use sanitary equipment of good quality.



JOHN F. ROURKE
Head Track Coach, Colgate University



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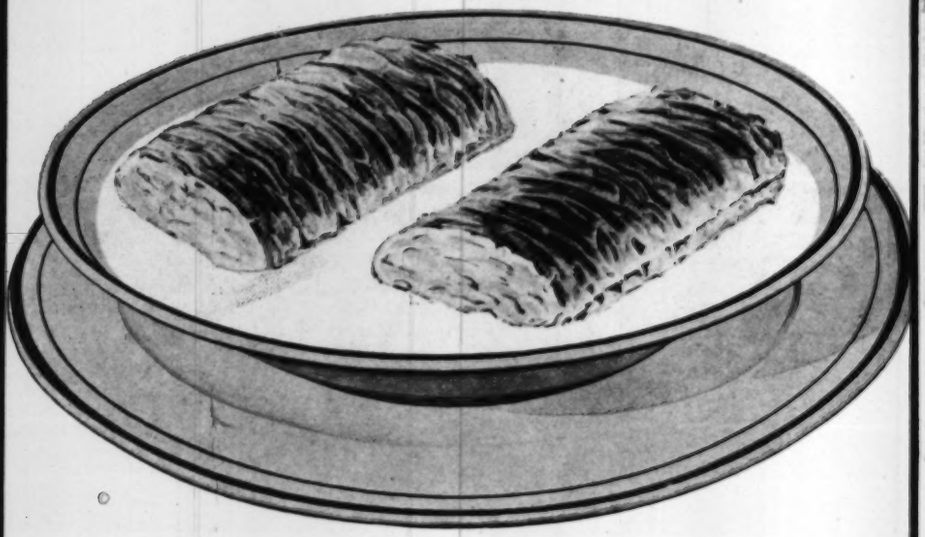

Shredded Wheat with milk or cream, with fresh or preserved fruit, is a quick pick-up for any time of day. And remember, when you buy Shredded Wheat you get your full money's worth —twelve large-size biscuits in each package.

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HERE BELOW

The perfect zone defense

THE football hunting season is on in full swing. The football hunting season differs radically from the three other football seasons. Football is a four-seasonal game, you know. The football season proper, appearing broadly between August and December, is the third in the cycle of seasons. It is the season for which the three others exist, and is properly the climax. It is called the season of games to differentiate it from the three other seasons.

Immediately following the season of games and continuing on through the holidays and for a few weeks thereafter comes the lobbying and round-table season, known as the season of gab. This is when obituaries are said over the late season of games, when alumni and barbers become rhetorical over the worthlessness of the present coach, when all the pet grievances against the rules are voiced and then acted upon by the authorities. We have just passed through this season.

Now, the hunting season, or the season of grab, is not so definitely bounded by dates as the season of gab, the season of games and the spring practise season, which is the fourth season. The hunting is best, of course, immediately following the season of gab, because then the hunters find it more convenient to go afield to stir up their quarry, not being occupied with the responsibilities of the other seasons. By the time the spring training season comes around most of the hunting for the year is in the bag.

THE public is not very familiar with, and not very interested in, the football hunting season. The newspapers say nothing about it, the colleges say nothing about it, and the high schools are ashamed of it, but are helpless. The high schools have considered placing signs "No Hunting, Under Penalty of Rule 11, Article 5,"* but the hunters would not see this sign, even if it were placed above the entrance to the school, because most of the hunting is done from ambush, such as hotel rooms, country clubs and downtown offices.

Have you a little quarry in your school, an all-state, well-fed halfback, tackle or end? If you now have one, or have had one or more in the past, you are familiar with the tactics and technique of the tribe of huntsmen. To those of you who have not yet been favored with the presence of an all-state, all-wanted player on your team, we can only hope that when you get one you will do all in your power to prevent the huntsmen from tearing him limb from limb. They pounce, not only to kill, but to destroy the sense of value.

THE hunting is insidious and subversive, otherwise it would be done openly and sportingly. It is not licensed. The colleges, officially, are unaware of the season, but, unofficially, they are aware of it. The high schools are both officially and unofficially aware of the season, but nobody seems to care. It is not a season that has been recognized by the State Game Commission, although it ought to be to give each collegiate hunter a fair chance at the prey.

In view of the lack of interest in the football hunting season taken by State Game Commissions and the College Entrance Examining Boards, we have a little suggestion to offer our pioneering national government, to wit, that General Johnson appoint some gentlemen from the colleges and some gentlemen from the high schools to submit "a Code of Fair Competition for Hunting of and Retail Trade in High School Football Players." A very nice code could be worked out, and, if given the slightest encouragement, we will do it ourselves. Our address, General Johnson, is 155 E. 44th Street, New York City, and we will work for such a cause with overflowing patriotism at the rate of $1 per year.

Up-sa-Daisy

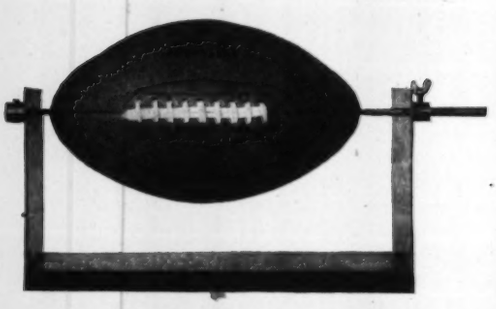
THE Oregon State football team hoisted its center into the air to block kicks for the extra point after touchdown, and was fairly successful with it. Now that the basketball championship tournament season is about to begin, we are offering, with the generosity that abounds in us this month, a suggestion by which a team can go right through a tournament to the championship with hardly a goal being scored against it. Robert Day has expressed the idea in the above drawing. It is the strongest case we have yet seen or heard of in favor of the zone defense. It is called the one-over-one defense, and in some sections of the country, the vertical zone defense. If you win a championship with it, please let us know. We like to keep a record of how our ideas carry out in practise.

Football rules changes

MOST everybody seems to be happy over the three important changes in the National Collegiate A. A. football rules. These changes, made at [Concluded on page 31]

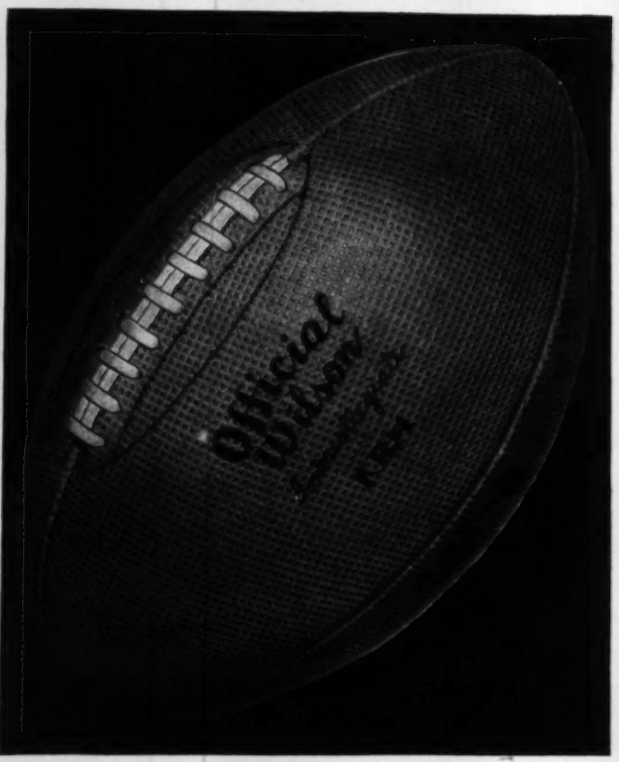
*"There shall be no unsportsmanlike conduct by players, coaches, trainers or others connected with a team . . . " Official Intercollegiate Football Rules.

Wilson makes a major improvement in footballs



The above illustration shows the Wilson balance testing device. • An ordinary football placed in this machine and spun on its axis, whirls unevenly, with a loping motion.

• The new Wilson Perfect-Balance Football spins smoothly, evenly, when placed in this balance tester, proving that its flight through the air is more easily controlled.



• Shown at the National Coaches Convention this football received the enthusiastic plaudits of leading coaches of the country. "Marvelous", "Just what the game needed", "We never realized such improvements could be made", were some of the comments.

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PUTTING THE SHOT

By David L. Holmes

This is the second of Mr. Holmes' series of four articles on track and field athletics.

HERE we have an event in which we may follow *type*. Shot-putting is a big man's game—a strong man's game. The bigger the shot, the stronger must be the putter—and we generally expect bigness with super-power (but not necessarily super-power with bigness).

I can hear some of my readers shouting that it does not take a great, big boy to put the shot. High school coaches, more than others, are often compelled to teach shot-putting to boys who could not be regarded as powerfully built by any stretch of the imagination. Many coaches have to make the most of small men because their big men are found to be lacking in some other qualities that make up the good shot-putter. But for the purpose of illustrating and recommending form in this article, I am going to the *great* shot-putters for the source of my material—my interest, for the purpose of noting and recording style and form, is not in the mere point winner. What we want to discover, by studying the style of the champions, is what they have which enables them to do it best.

It has been my pleasure to train, along with my own men, several high school shot-putters. Two of them, each weighing 170 pounds, went over the 50-foot mark—one got out past 52, in fact. One went to a university and fizzled out entirely—I don't think he even hit the 43-foot mark. The other one intends to enroll with us next fall, so we shall see just what he will be able to do.

Just a very short roll-call of the "greats" — Rose, a veritable giant; Kuck, a big, powerful brute; Douda, the same; Heljaz, built like a war-tank; Brix, a big, powerful man; Sexton, far bigger than the ordinary so-called "big man;" Jack Torrance, standing 6 ft. 6 in., I believe, and weighing 264 pounds. These men found 51 feet mere play. I might mention, as exceptions, some really very good putters who were "small" men—Houser, Jones of N. Y. U., Beatty, the old Columbia man; Dues, my own protege; Rhea, the Nebraska sensation. Rhea was the biggest of the four, weighing about 205, and was wonderfully built. Dues was the smallest of the four, tipping the scales at 185 in condition. Dues was too small a man to beat the 51-foot mark. An injury always handicapped him and may have been responsible for his failure to hit that mark.

Of course, so many, many factors enter into this thing — competitive spirit, sane and sensible training, efficient coaching, mental fitness, coordination, home conditions. But years in this game have taught me to look for a *big* man when records are to be smashed.

Year after year I have watched shot-putters step into the ring and do everything but *put* the shot. I have seen many potential champions do forty-two their freshmen year, and end up three years later with only two feet added to their best freshman mark. Any good, big college man who sticks to the thing over this period of time ought to be able to get out to the 48-foot mark, at least.

ILLUSTRATION No. 2: "SO MANY WOULD-BE PUTTERS LAND WITH THE SHOT AND THE ARM IN SUCH A POSITION THAT THE *PUSHING* OF THE SHOT IS REALLY AN IMPOSSIBILITY."

With the high school boy the coach will have to be more patient. The high school boy who isn't bettering his distance fast cannot be forced to over-do himself. He is young, perhaps growing especially fast at the time. But, with his 12-pound ball, he ought to get within speaking distance of fifty feet, if he is the type. The national high school record is 58 feet, 10 inches, made by Elwyn Dees of the Lorraine, Kansas, High School in 1930. Dees had a peculiar form, which has worked against him as a college putter at the University of Kansas, where, I understand, an effort was made to change his style with considerable success. Dees sort of walked across the ring in violation to all orthodoxy in form. Yet his mark still stands as the national high school record. But that was with the 12-pound shot. When Dees began heaving the 16-pound shot in college he found his unorthodox form more of a handicap than he expected.

As I have observed it, the major difference between the high school putter and the college putter, generally speaking, is in the timing of the turn or pivot of the body in the act of actually putting the shot. The younger, less experienced boys tend to dissipate their potential power by start-

ILLUSTRATION No. 1: "HOW PERFECTLY OUR BIG-TIMERS KEEP THAT PUTTING POSITION WHEN THEY SLIDE AND LAND."

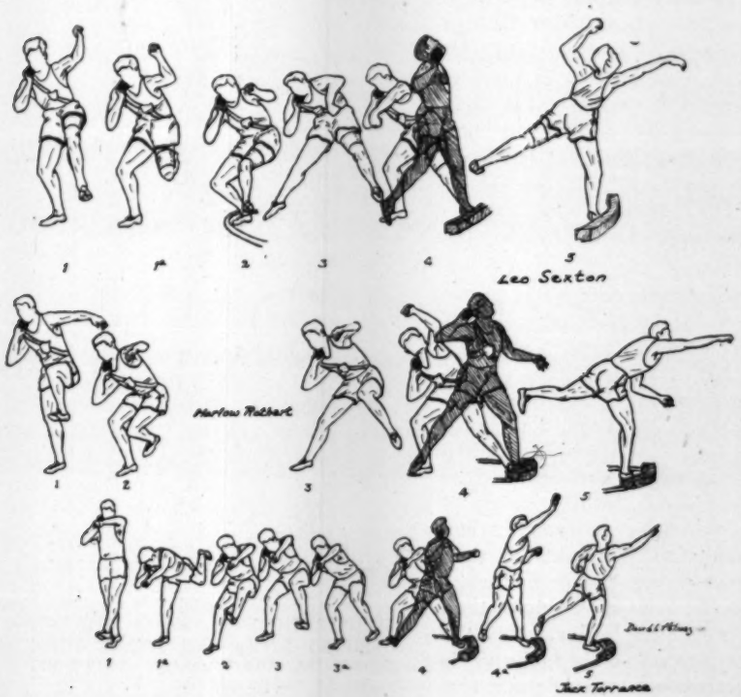


ILLUSTRATION No. 3: "HUGH RHEA AS HE LANDS, THEN AT HIS MAXIMUM HITCH-BACK (MIDDLE FIGURE), AND THEN THE POSITION OF THE BODY AT THE MOMENT THE LEFT FOOT SETTLES FLAT ON THE GROUND."

ing the turn of the right shoulder and upper body too soon and making a relatively slow front pivot out of it instead of a spring, an explosion of energy. This encourages the mis-application of power out of the line of direction of the flight of the shot. A good, big high school boy, with his 12-pound shot, does not feel the handicap of this error in timing and body mechanics as he would if he were tossing the heavier ball.

The put analyzed

Let us analyze the put—divide it into its component six parts, as follows: stance, preliminary movements, the slide, the hitch, the put, and the follow-through.

Stance—I refer to position of body, hands, feet, shot in the hand, etc. The shot is laid as high up in the fingers as possible, with three or the four fingers back of it. It seems reasonable to say that the weaker the fingers and wrist the more fingers should be back of that shot, doesn't it? But—be sure that the fingers are *back* of the shot—back of the "inside back," not back of the "outside half," for the latter simply means either a slipping of the shot off the index finger, or what we call an out-curve put. Neither goes far.

The hand itself is relaxed, wrist limply cocked, as the shot holds it to the neck or shoulder. Do not "grab" the shot—this means tensed muscles when the put is made. The shot is nestled close up under the point of the jawbone, or to the neck. Some great putters have it rather close under the ear; others down in the pocket formed by the chain and the shoulder. The length of forearm and upperarm may determine just where it can best be placed. The head is tucked over the shot a bit, the eyes looking no farther ahead than across the side of the ring—not toward the front of the ring. The left arm is held out limply, bent at the elbow, the forearm parallel with the ground. The putting arm is ordinarily held at about a right angle to the body. However, some putters simply can't crouch or bend at all, in which case the elbow of the putting arm should be dropped somewhat.

What preliminary position should the body assume? Just look at the champions—and tell me. Hardly any two stand the same. After all, the *put* is not made till the slide has been completed. Each champion finds some certain position from which he can best make the slide and get into putting position. The position of the feet is perhaps more universally alike than anything else—the right one laid alongside the ring, and that leg bearing all, or nearly all, the weight of the body. The left foot is not important; but generally the toe touches the ground lightly.

Preliminary movements—The movements prior to the slide are also of comparative unimportance. Note in Illustration No. 1 that Sexton swings his left leg forward, thence in a semi-circle backward, bending it abruptly at the knee as it reaches back, then sweeping it forward and outward as he starts the slide. Rothert swings it very high in the first movement, then back to about even the right leg, then out. Torrance swings it forward, raising high on the toes of the right, then swings it very high backward as the right settles again and the body bends forward, and then swings the left forward and out with the slide.

Note that all three men shift the center of gravity well forward as the slide is started, that it may carry the body forward and at the same time keep it down. Remember, the term, "hop" is not such a good one to use, for too many putters do "hop."

The Slide—It is not a hop nor a jump nor a leap—it comes nearer to being a slide or a glide than anything I know. It is low, rhythmic, relaxed, and lands the right foot pretty close to the middle of the ring. Rothert's carried him 36 inches; Rhea's, the same; Krenz's, 41; Howell's, 29 (and Howell is at least 6 feet 7 inches tall, I believe); Torrance's, about 39. If the foot lands too near the stopboard, there will not be room for any *forward* drive—it will have to be too much *upward* drive. Also, it may result in the left foot's fouling over the stopboard.

During the slide, the shot is kept in contact with the neck or the neck and chin, as the case may be, and the arm is kept in position out nearly at right angles with the body. So, so many would-be putters fail right here—they land with the shot and the arm in such a position that the *pushing* of the shot is really an impossibility. In Illustration No. 2, our putter has already put himself out of the running, so far as this particular effort is concerned, for he can not possibly *put* the shot from this position of the right

ILLUSTRATION No. 4: "A PUT ATTEMPTED FROM THE FRONT TURN POSITION. PRACTICALLY EVERY BEGINNER DOES THIS."

arm and hand. Note in Illustration No. 1 how perfectly our big-timers keep that putting position when they slide and land.

Now, one of the real reasons why so many putters do this turn-around, shot-away-from-the-neck stuff is because the left leg is not swung properly. Practically all beginners—and most old-timers—swing that leg *toward* the stopboard. This is, as a rule, a fatal error. Here is what happens when this is done—the foot travels toward the board, as the right foot lands, the knee of the left leg is allowed to bend, dropping the left foot down and back toward the left end of the stopboard as it touches the ground. This results in *turning the body toward the front.* Note that our putter in Illustration No. 2 is doing just that. To correct this, swing that left foot out toward the right end of the toeboard and see to it that the knee is not allowed to let the lower leg drop limp before the left foot does land—do not lock the knee, but keep that lower leg front a bit more. You will find that this swing will result in settling the left foot just about the middle of the toeboard, where it belongs. As the hitch comes, this left leg will really be pointed out from the stopboard a bit, and will settle straight ahead. Illustration No. 4 shows a put attempted from this front-turn position. Practically every beginner, unless watched, does this.

ILLUSTRATION No. 5-a: "A GOOD POSITION FOR THE START OF THE SHOT AS IT LEAVES THE BODY—SHOT HAS ALREADY LEFT NECK."

ILLUSTRATION No. 5-b: "THE FAULT OF ALL BUT THE GOOD PUTTERS—THE SHOT PULLING THE PUTTERS OFF TO THE LEFT SIDE OF THE RING."

The Hitch—I like better to call it "drawing the bow-string back"—or "coiling for the kill." So many wish to know when this hitch-back really starts—is it done as the slide is being made or as the right foot lands, or after? Does the left land at the same time as the right? If so, how is the hitch-back made? Etc.

First, the right foot lands *before* the left toe touches—considerably so. A few putters try to have the drawback of the bowstring completed before the right toe touches, but most of them draw it back afterward. Illustration No. 3 shows Hugh Rhea, a sensational young man, as he lands, then at his maximum hitch-back (middle figure), and then the position of the body at the moment the left foot settles flat on the ground. Note that he lands with the left leg in front, then draws way back and around until the shot is entirely lost to view. Also note the position of the left leg here—he is bound to put that left foot down too far to the left—which he always did—very badly his first two years in competition. The last figure shows that he has done a lot of heaving off that right leg of his! I claim that Rhea had the most wicked arm in captivity—it whipped out like the striking of a coiled rattler. In this very effort shown here Rhea shoved the shot over 52 feet 5 inches—quite some put. His drive from the extreme crouched hitch-back was devastating. Most putters do not hitch so far back. Really big men like Torrance and Sexton would have trouble in coming out of such a crouch, I believe.

The Put—We call it "the kill." Here is that explosion of pent-up energy. It starts with a forward *raising*—not a forward *twisting*—of the body. The forward twisting will result in rotation at the waist—fatal if carried to the extreme. The 16-pound shot is too heavy to permit of too much rotation. So, the body really starts to uncoil sidewise—lifting up, then gradually turning as the shot is started on its way. The body is still well to the side when the left foot settles. This means that the shot is pushed *across the chest* in its first movement. Really, the shot is a bit too high to say that it crosses the chest, but that is the feeling. The arm itself is what crosses the chest. Note in Illustration No. 1 how superbly Sexton and Torrance do this—no "falling away from" the shot here.

Illustration No. 5-a shows a good position for the start of the shot as it leaves the body. The body has turned with the shot, is bent forward, the elbow is back and under the shot. No. 5-b shows the fault of all but the good putters—the real putters. Only one thing can result from such form as this—*the shot pushes the putter off to the left side of the ring*—it never fails. By trying to have the position as shown in 5-a, the *putter will be able to do most of the pushing.*

No. 4 shows what happened to Harry Hart, of South Africa, in the Olympic Games. The shot has pulled him far over out of the line of the put. Note that the center of gravity is going out toward the side of the circle. And I saw Hart hitting 51 in practice—but not with this form!

The shift of the feet—the reverse—is not started till the shot leaves the hand. Many high school putters seem to think that the reverse is done as the shot and the body come around together. I won a big soda on this once—from a high school champion, at that. Had to take a snapshot of him with my Graflex to prove it. Wondered why I couldn't get him past the 40-foot mark with the 16-pound shot—and discovered that he was simply reversing with the shot—no shoving at all, really. When he saw the picture, he went to work—and that day passed the 42-foot mark. He learned that one has to put the shot from a set position.

A final word about the actual putting movement. The difference between a "dead" put and a "live" put is in the final flip of the wrist and fingers as the shot leaves the hand. This "fare thee well" impetus given by wrist and fingers will put life and add inches to a put that otherwise might be perfect in all the preceding movements.

[Continued on page 27]

ILLUSTRATION No. 6: "THIS GENTLEMAN HAS NO IDEA OF HIS PHYSICS. HIS POWER HAS BEEN APPLIED OBLIQUELY—ACROSS THE LINE OF FLIGHT OF THE SHOT."

FOOTWORK IN BASEBALL

By George Moriarty

Mr. Moriarty is entering his twenty-eighth year of service in major league baseball. As player, manager and umpire over this period he has witnessed the most dramatic events of modern baseball. In addition to his work as umpire in the American League, Mr. Moriarty has been serving baseball in a rather unusual capacity in recent years by making personal appearances at high school assemblies to speak on his experiences in the game. He brings to the platform, and to his writing, a personality as virile as the game he represents.

FOOTWORK in its relation to the mechanical and physical performances of fielding, is a vital fundamental in the primary period of fielding development, inasmuch as the feet and the legs actually determine the proper equilibrium of the body in the execution of rapid single outs and double plays, which involves throws from various angles.

While speed of foot is essential in retiring the fleet-footed base runner, it can also be over-done, particularly when the fielder dashes headlong at a slow grounder, and in so-doing, sacrifices his chance to field it cleanly. Slowing up a trifle is the cure for this fault. However, if the base runner is an unusually fast runner, the fielder is justified in taking a desperate chance to retire him by using all possible speed in fielding the bunt, "drag," or slowly batted ball. Many infielders come to the big leagues with the glaring defect of "over-playing the chance," and while it gives them the appearance of being flashy, it robs them of the sureness that makes a finished fielder.

The demand for footwork in an exceedingly wide variety of steps, angles and throwing stances, is greatest on the infielders. Their judgment of hops, sizzling grass-cutters and bounders often depends on the response of the legs to the situation, with the immediate throw to base involving no less a demand on these regulators of the body balance. One of the greatest of shortstops of the past twenty-five years, Roger Peckinpaugh, was an outstanding example of an infielder whose brilliant fielding feats seemed to be always attended by perfection in footwork. Such faultless response to the innumerable situations that can occur when a ground ball is hit, smacks of genius, and no doubt it is to an extent. But it is genius that was developed through the channels that are open to all players—daily practise and experience in handling the ball under all conditions.

When Ty Cobb came to the big leagues back in 1905 he was an awkward and ordinary outfielder. His burning ambition and readiness to work on his weaknesses raised him within a few years to the baseball heights. To watch Cobb chasing flies in his prime was to see the supreme master and judge of distance, direction and speed. It seemed that the crack of the bat was the signal by itself for sending Cobb to the right spot. He looked the part of the born ball player, to him fly chasing was as instinctive as eating, but it was well known that he was developed out of a rookie, as most ball players are.

But in contrast to Cobb there was Tris Speaker who was what may be termed a finished fielder when he reached the big leagues. His development merely came earlier, and perhaps, easier. As an infielder, George Sisler may be placed in this class also. He was a highly finished product during his college days at the University of Michigan, so that when the St. Louis Browns signed him to a professional contract in 1915 they had what some people called a "born" ball player.

The third baseman is the one with his feet in the air.

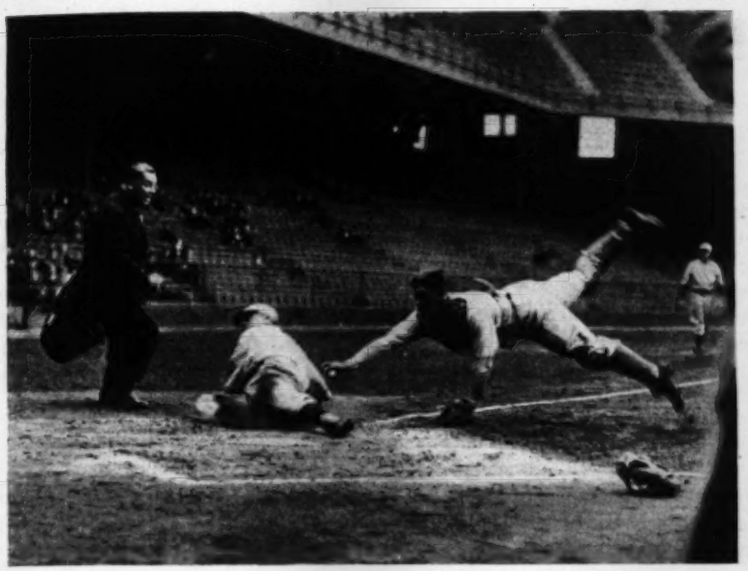
The coach who would improve and "key up" his infielders to efficiency in handling the ball should confine most of his attention to the ground ball. The coach should have his infield-practise batter follow a system of batting fast grounders alternately to the left and the right of each fielder, and, now and then, a grounder directly at them "head on." The speed and pace of these batted balls should be varied as much as possible by mixing in red-hot grounders with slow rollers, bounders, bunts and pushes, with constant encouragement called out to the infielder to start quickly for the ball. If he is seen to be making false starts, either because of nervousness (as often happens with high school players just out for the team) or some less obvious reason, the coach may find it advisable to slow this player down until he begins responding better.

While a major part of the fielding time should be spent on ground balls, the coach will want to give his infielders enough practise in flies to keep them familiar with all the possibilities in the air. He should have the infield-practise batter hit short flies and Texas Leaguers directly over the fielders' heads to the right and the left, as the backward running catch is one that every infielder is called upon to make from time to time, and is much more difficult in execution than the simple pop-up in front of the infielder.

As the infielder moves back for the Texas Leaguer he should, except in the rare instances when a fly is deep and practically in the outfielder's territory, keep his head turned toward the ball with his eyes on it as he retreats. The exception is in the case of the deep fly, travelling rather high, which may or may not be within the outfielder's reach. On these, when it is uncertain whether the ball is for outfielder or infielder, the infielder may find it a time-saver to make his first dash at sprinter's stride, not looking up until the ball is on its descent. The infielder must realize on all these chances that if there is a fair probability that the outfielder can reach the ball it is better to give way to him, for he, moving directly toward the ball, is in a much better position to make speed and to see exactly what the ball is doing.

Relaxation and confidence in his ability to handle anything that comes his way and some things that don't, are great assets to the infielder. These prepare him for the quick get-away and footwork to meet the really difficult situations. With muscles relaxed while awaiting the pitcher's delivery, and his mind alert to meet all the possible play-situations, the infielder is prepared to get the jump on the ball, which is half the battle in the art of "coming up" with the difficult grounder in a pinch.

Sometimes the best of players go through their baseball careers without correcting a glaring weakness. Hal Chase, first baseman of the New York Americans from 1905 to 1913, is generally accepted as the nearest to per-



A DIVE AND A PUTOUT BY A GREAT CATCHER: MICKEY COCHRANE OF THE PHILADELPHIA ATHLETICS GETTING HIS MAN IN A BRILLIANT FLASH OF ACTION AT THE PLATE. THE PHOTOGRAPH BELOW SHOWS THE SAME PLAY AN INSTANT LATER TAKEN BY A SECOND CAMERA.

fection among first basemen, where the application of footwork has variations not to be found at any other position. Chase's legs and feet invariably responded with the correct movement at the crack of the bat, or as the ball was being fielded preparatory to the throw to him. Yet Chase had one shortcoming which was concerned, not with his play after the ball had been hit, but before it was hit. He played too deep off first base, and quite often induced bad throws by forcing infielders to throw at the bag while Chase himself was still ten to twelve feet away.

Upon reaching the bag, a first baseman should take a position directly in front of the base, and place either foot upon it according to the accuracy of the throw. This affords him the chance of putting the proper foot on the base, and consequently gives him correct body balance. It also primes him for a stretch of arms and legs to the maximum length for throws that jump and sail unexpectedly into wide throws.

One of the most difficult plays for a third baseman is involved in playing in for a prospective bunt when the runner on second is sprinting to third on the play. The trouble arises when the batter misses the ball. The third baseman must then start instantly in sideways fashion for the base. He has no time to gauge the exact location of the bag, but is obliged with the last few steps to back toward the base in a straddling position, take the catcher's throw and tag the runner.

When I first began my career as third baseman in the American League, I found that tagging a sliding runner was a most difficult task. Charley O'Leary, who was then a great fielding shortstop for the Detroit team, pointed out my shortcoming in this respect. He instructed me to "let the runner tag himself out" as he quaintly expressed it. The baseman should not be so gullible as to go after the runner's feet as he comes in, but should merely bend the body and place the gloved hand on the ground in front of the bag, ready to move quickly with any unexpected movement of the incoming leg of the slider. From this position, the baseman can move his hands any number of inches to touch the slider if the latter is trying for a corner of the bag or misses it entirely.

It is not always feasible to "let the runner tag himself out." If the ball comes in wild of the bag, or comes in none too soon, the baseman will have to make his effort at put-out by any possible means. The picture on the opposite page and the two pictures of the one play on this page reveal situations of this nature. On the opposite page the camera was snapped just as Pepper Martin, playing third base for the St. Louis Cards, returned to earth after a collision with Lee of Philadelphia. The photograph gives the appearance that Lee is the baseman and Martin the runner, for it looks as though Lee were trying to place the ball on Martin, who it appears is sliding (rather queerly to be true) into the bag. But this is not the case. Lee is not attempting to tag Martin, but is trying to reach the bag.

The catcher is the member of the team involved in most of the close plays of the acrobatic, lunging and collision type. He has to be a most alert individual on his feet. He is up and down more than any other member of the team in the performance of the ordinary duties of giving signals and catching the ball. His squat must be developed to the point where he is as much at ease down as he is up.

When off-balance is induced by a poor pitch, a catcher should struggle valiantly to regain his feet, preparatory to making a throw, or starting a lunge forward to tag a runner sliding into the plate. At all times he should be prepared to spring forward across the plate in readiness to field short bunts in front of the plate. Proper foot and leg action also induce quick starts in getting around the plate-umpire in order to capture foul flies close to the stands. Moreover, after an unavoidable collision in the process of tagging a runner at the plate, the catcher should at all times be ready to spring to his feet to make a throw to one of the bases.

SAME PLAY AS ABOVE, TAKEN WITH A SECOND CAMERA.

ELECTRO- AND LIGHT-THERAPY

By Peter V. Karpovich, M. D.

The use of electricity in the alleviation and cure of disease, and in the treatment of athletic injuries which is our particular concern, has in recent years become a matter of popular interest. Many claims have been made for it that could not be justified. Scholastic Coach has asked Dr. Karpovich to write on the present status of electro-therapy as applied particularly through diathermy and ultra-violet and infra-red rays.

WHEN one hundred and fifty years ago the Italian professor Galvani discovered that there was a flow of electricity in the injured muscles of a frog, he could not even dream that eventually electricity would be considered a basic energy of life itself.

Last spring Dr. G. W. Crile, lecturing in New York, explained that the mental processes depend upon the flow of electricity in the nerve cells. This lecture attracted world-wide attention as a logical theory and did not produce any great surprise. We know now that every cell in the body represents a small electric cell. Every function of the cell is accompanied by the production of an electric current. This knowledge has been utilized in medical diagnosis. In order to find, for instance, what is wrong with the heart, a physician can simply record on a photographic film the amount of electricity produced during the action of the various parts of the heart, and this serves as a basis for his diagnosis.

The electric conception of biological processes gave a strong impetus to electro-therapy. If we can recharge an electric battery in an automobile, why is it not possible to do the same with the cells of the body? This is logical, but unfortunately our knowledge concerning the recharging of the body cells is still in its infancy and therefore crude. What would you say if an electrician, recharging a storage battery, would attempt to do so by connecting the feeding wires with the handles of the battery instead of the poles? One gets the impression that something of this nature is done by many men handling electro-therapeutical appliances. Without casting reflection on the honest and competent workers in this field, we have to admit that there are many quacks and fakers who hide their ignorance behind the shiny and impressive-looking apparatus, and prey upon their gullible victims. It is gratifying to note that the leaders in this field are doing their best to remedy the existing situation and weed out the undesirable element.

Electro- and ray-therapy is widely used in the colleges. At Dartmouth, Harvard and Yale, to cite but three, hundreds of treatments are given during the year, the busiest time being the football season. The work is done by qualified men under supervision of the college physicians. This kind of therapy is finding its way into the high schools also, and some of the larger schools already practice it with success. The operation of the electro-therapeutical apparatus is a rather simple matter and any intelligent person can easily learn it under proper direction and with practice.

The purpose of this article is to acquaint the reader with the present status of this kind of treatment and its possibilities in a department of physical education.

Some remarks concerning treatment of athletic injuries—In order to simplify further discussion of the topic it is necessary to emphasize the principles involved in treatment:

1). Do not increase the extent of the original injury.

2). Help nature to repair the damage.

While the first principle is perfectly obvious it is frequently violated. The second rule needs some clarification.

Nature takes care of the injuries in the following manner:

a) Sensations of pain are created which force a rest for the injured part and prevent greater damage.

b) Through an increased blood circulation more blood will come later to the injured part, increasing the local temperature, bringing more white blood corpuscles which help to remove the dead tissue, supplying more tissue-building material and increasing the elimination of the wastes.

c) Infection is taken care of through an increased germicidal action of the blood.

DIATHERMY TREATMENT, SPRINGFIELD COLLEGE

INFRA-RED RAY TREATMENT AT SPRINGFIELD COLLEGE

Diathermy

The principle of the construction of the diathermy apparatus—A diathermy apparatus is a machine which converts an ordinary house electric current into a current of extremely high frequency and high voltage. It consists essentially of two transformers and one condenser.

If we attempt to use for treatment an ordinary house current by itself a very serious injury and even death may result. The reason for this is twofold: First, the amperage is high; second, it allows the development of polarity in the cells of the tissues. In an ordinary cell, substances making up the protoplasm carry electric charges. These particles with opposite charges are distributed without any order. When we send a direct current through the cell the charges arrange themselves according to the direction of current, positive charges accumulating at one side of the cell and the negative at the

opposite side. When the total effect of these charges becomes sufficiently high, they break through the cell-membrane and cause the destruction of the cell. When the current is alternate, the current regularly changes its direction. If it happens to be A.C. 60 cycles per second, it means that the current changes its direction 120 times per second, going sixty times in one direction and sixty times in the other. This is a comparatively slow change and allows the development of cell polarity. In diathermy the frequency of the cycles may reach several millions per second. The duration of each cycle is so brief that no polarity effect can be produced. Yet the tension of the diathermy current may be as high as 40,000 volts as compared with 110 or 220 volts in the house current. Under the influence of high frequency current the charged particles within the cell merely vibrate. This is why some people refer to diathermy as "molecular massage," which is misleading, since any kind of heat will produce a molecular "massage" through an acceleration of the molecular motion.

Physiological effect of diathermy—Dr. A. Hemingway gives the requirement for diathermy treatment as approved by the Council on Physical Therapy of the American Medical Association: "The sole therapeutic benefit results from the production of the increased temperature of the tissues treated. It will be required that in any diathermy treatment there will be no electric stimulation of any neuro-muscular mechanism whereby a sensation of pain or shock results."[1] This quotation explains why diathermy is called sometimes an "internal baking."

Mr. S. Benson[2] in 1930 attempted to give a comprehensive summary of the physiological effects attributed to diathermy. He found it an impossible task because there were so many contradicting statements. He showed clearly that our knowledge of the action of the diathermy is inadequate and necessitates a more intensive investigation. Dr. J. S. Coutler's findings[3] two years later resulted in the same conclusions showing that opinions were still substituted for facts. The text books on physical therapy naturally represent existing conditions more optimistically. It would be sufficient to name two of them: one by Dr. C. M. Sampson[4] and the other by Dr. F. B. Granger[5]. Without attempting to give a summary that would satisfy everybody, it is possible to divide the effect of diathermy into two parts.

I—The primary effect—an increase in temperature.

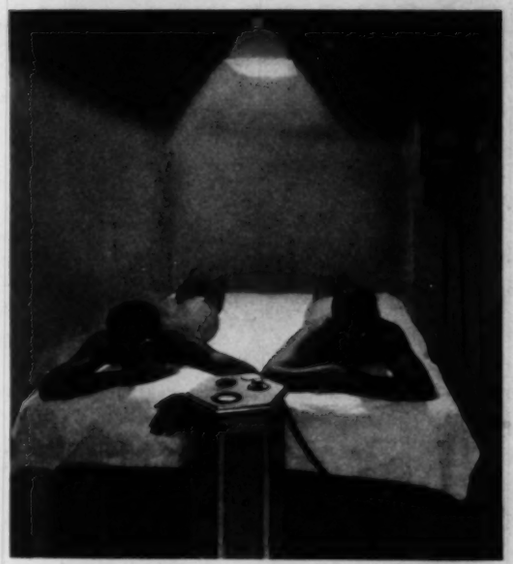
II—The secondary effect—a relief of pain and an increase in the local blood circulation.

The second factor may neutralize the effect of the first to a great degree. Drs. C. A. Binger and R. V. Christie found that diathermy could not change the temperature of the lungs of a dog as long as the blood circulation was intact. As soon as the artery supplying the lungs with the blood was shut off, the temperature immediately rose. The direct bactericidal effect of the diathermy in the living body is still doubtful and needs further investigation.

Cases in which diathermy is being used—The list of the diseases is too long to be mentioned here. The physiotherapists use diathermy practically in every disease. The results obtained appear to be not much different from those received with any other method of treatment. The reason for this is that the treatment itself is not injurious and the period of time used for the course of treatment is long enough to allow a spontaneous cure, or at least improvement.

Injuries in which diathermy is helpful—Sprain, strain, tenosynovitis, synovitis, tennis and golf elbow, bone bruise, delayed union of fractured bones, charley horse.

Contra-indications — Pus without drainage, lesions with a tendency to bleed.



Courtesy Burdick Corp.

ONE-LAMP, TWO-COT ULTRA-VIOLET SOLARIUM

Precautions—Careless use of diathermy may cause burns. One should not attempt to use without previous training under a competent instructor. Persons desiring to experiment with this kind of treatment should have a knowledge of the basic facts on electricity which are involved in the construction and operation of the apparatus. Effectiveness of the treatment will greatly depend on this knowledge.

Description of the diathermy apparatus—Most of the machines are so constructed as not to require any special wiring and the ordinary alternating house current may be used. If only direct current is available, then a transformer should be used which will convert it into an alternating current.

The diathermy machines are divided into two groups: portable and cabinet. The cabinet type is more powerful and is used mostly by hospitals and offices where a treatment of the large areas and deep organs is practiced. It costs between $300 and $500. The portable type may easily meet all the demands of an athletic department in a college or high school. The cost of a portable apparatus with accessories ranges from $180.00 to $240.00. A mobile cart may be purchased for an extra $25.00. The apparatus can then be wheeled about the place. This will facilitate the combination method of treatment where various modalities are used one after another.

[Concluded on page 28]

PORTABLE DIATHERMY APPARATUS

Courtesy H. G. Fischer & Co.

[1]Hemingway, A., Journal of Amer. Med. Assen., vol. 101, p. 776, (Sept. 2) 1933.

[2]Benson, S., Research Quarterly, vol. 1, p. 52, (Dec.) 1930.

[3]Coutler, J. S., Journal of Amer. Med. Assen., vol. 98, p. 1987, (June 4), 1932.

[4]Sampson, C. M., A Practice of Physiotherapy, Mosby Co., 1926.

[5]Granger, F. B., Physical Therapeutic Technic, Saunders Co., 1929.

BASKETBALL, THE ATHLETIC FAD THIS YEAR—1897

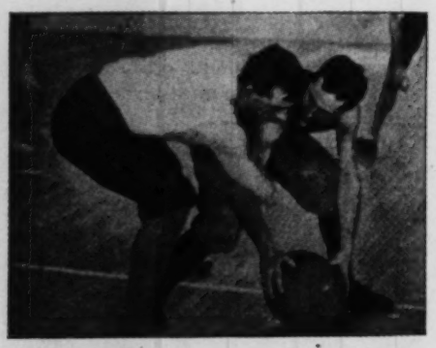
By James Pryer Allen

Basketball was in its infancy when Mr. Allen wrote this article for the January, 1897, issue of *The Sportsman's Magazine*. The "long life and merry one" predicted for the game thirty-seven years ago seems to have been at least partially realized.

MANY games have been devised to break the monotony of the long winter of athletic inactivity, but none has ever reached the popularity promised for basketball, the athletic fad of the year. No other combines so many of the desirable features of the outdoor sports, and is still practicable for indoor play during the long winter months.

Basketball offers all the fascinations of team play and excitement of football, without its roughness; all the better points of water polo, with much quicker action, and more practical requirements. It offers the best possible variety of indoor exercise, with all the interest and excitement — for both player and spectator—that could possibly be wanted, and is still adaptable to almost any gymnasium. Under these circumstances, it is not surprising that its devotees predict for the sport a long life and a merry one.

Basketball is by no means a new game, although it is only within the last year that it has become universally popular. It has in reality passed its eighth birthday, and though a youngster in the family of sports, it is a lusty one. James Naismith, of the Young Men's Christian Association Training School,* of Springfield, Mass., is the father of the game. It was first played in the gymnasium there.



A foul tackle

A study of the first rules under which the game was played reveals the fact that it was originally modeled very closely after football. Indeed, it might have been appropriately called indoor football, though the elements of water polo are also noticeable in its makeup. In the earliest games, the floor was marked off somewhat after the fashion of the present football "gridiron," penalties of distance being allowed for fouls. All of the rough elements of football were carefully eliminated, however. A player could not hold the ball or run with it; he must not tackle an opponent or strike him, and such a play as the present football scrimmage was not to be thought of. The ball could not be advanced by kicking; only hand-to-hand passing, or rolled along the floor. Under these rules, the area of the floor space decided the number of players on the teams, and they were made up of five, seven, nine or eleven men.

When Yale took up the game last year she played seven men, and her basketball players still believe that this number is far better than the smaller teams playing this winter. Trinity and Wesleyan, the other colleges that have entered with Yale in the Tri-Collegiate Basketball League, will each play seven men, while at the University of Pennsylvania, the five-man team will be adhered to.

A basketball team is made up of a centre, two forwards and two guards. The forwards conduct the attack, while the guards play opposite them and defend their goal from the opponents' assaults. The centres play opposite each other in the middle of the field, put the ball in play by "facing," as in lacrosse, polo and similar games, and turn their attention to either attack or defense, according to the needs of the moment. The ball used is similar to a football, being of leather filled with air, but is round and not elliptical. There is a basket hung ten feet from the ground at either end of the field, and these serve as goals. The aim of the players is to toss the ball into the opponents' basket. All scoring is done in this way.

Some of the finer points

The "held ball" is a play closely related to the "down" in football. When two or more men hold the ball so that it may not be freely put in motion, the referee stops the play. He then starts the interrupted game by throwing the ball up between two opposing players at the place where it was held. Should the ball be held on the side-line, it may be put in play in the centre. Whenever the ball goes out of bounds during the progress of the game, it is put in play again by the player who first touches it after crossing the line. He may pass or throw it from the spot where it passed out of bounds, or he may touch it to the ground, and put it into play again by "dribbling" it. This admits of some rare skill. The opposing player endeavors to cover and block the pass, and it is the object of the man throwing in, to dodge or mislead him.

Shooting a goal

The use of signals has not yet entered into basketball to much extent; but there is a decided need for some method by which the captain can direct the plays of the men, and there are some concerted plays which a signal would assist in putting into action. The New Britain, Conn., team has developed a system of signals which is remarkably effective. Yale has been working with the problem, especially in perfecting a new strategic play in which her guards and forwards change positions.

Interfering guards

By far the most responsible position on a team is that of centre, and it requires a skillful all-around player. He should be able to throw goals quickly and accurately, and his passing should be above reproach. He should also be able to break from the "cover" of his opponent and follow the ball very closely. The guards, right and left,

*Now Springfield College—Ed.

are the most undesirable positions on a team, for their work is all defensive. They are forced to follow the opposing forwards closely and at the same time watch for any play to centre. This position is also open to more chance of fouling than any other. The temptation to tackle the opposing forward or shoulder him is one that is difficult to overcome. The forwards' positions allow of the most brilliant playing. The men who play these positions are always the fastest. They have the opportunity, too, of developing more original plays, in combination with the centre, who "feeds" the attack, than the guard can ever hope for. Indeed, the duties of the guard are merely to interfere with the forward, and if he does get the ball on a fumble, or an unsuccessful try for goal, he passes it at once to the centre, or throws it to his forwards at the other end of the field. There is little chance for brilliant play by a guard.

When seven men compose a team, two additional centres are allowed. They play in practically the same position as the forwards, but do not advance quite so far down the field, acting as a connecting link between the centre and forwards in the attack. The seven-man game, as can be readily understood, develops a much more rapid game than with five-man teams, but it also admits of more roughness. The University of Pennsylvania team has tried the experiment of playing six men. In this case, two players are known as centres, although but one of them jumps for the ball at the toss-up when it is put into play. The centres pass to forwards on either side of the field. This, they think, is an improvement over the five-man game, and affords an excellent compromise. On the University of Pennsylvania team, and some of the others, the men playing forwards are spoken of as right and left attack, while the guards are known as right and left defense. The name of the centre position is unchanged.

The one with the whiskers is the coach

Dr. Stagg, end-rush

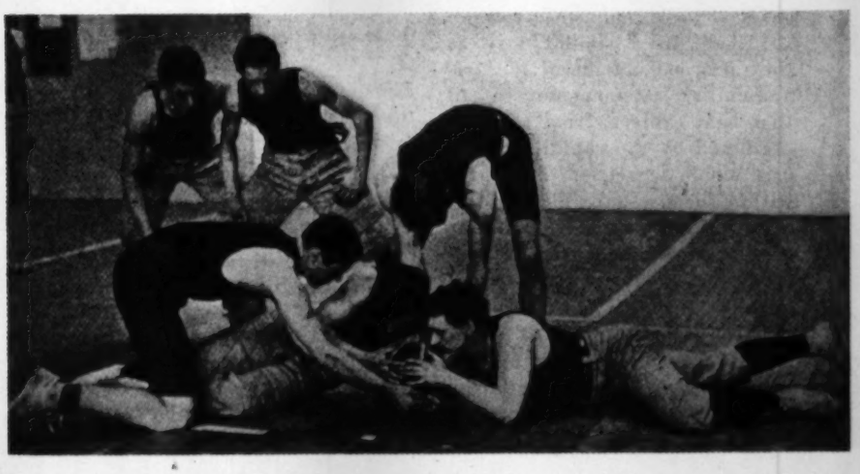
The hustling University of Chicago has not been left behind in basketball. Teams of both men and women there play the game and there is great rivalry over the sport. As yet, however, the men have never met their fair "co-eds." Dr. A. A. Stagg, Yale's famous pitcher and end-rush, and now director of athletics at Chicago, has devoted much time and assistance to furthering the interest of basketball there.

Basketball was not favorably considered as a game for women until two or three years ago. It was then introduced in a number of the Young Women's Christian Association gymnasiums, where it met with some success. Then the colleges devoted exclusively to the education of women experimented with the game, and today it is firmly established wherever it has been taken up. At Bryn Mawr College basketball has met with the approval of all interested in athletics, and Dr. Alice B. Foster has been instrumental in bringing the game to its present development at this institution. The Bryn Mawr girls are said to play a very rapid game, and the accuracy of their throwing for goals is far better than might be expected. At Smith College, Wellesley, Vassar and many others, the game has become very popular.

The proper thing to wear

The costume worn by women for basketball is that usually used where athletic exercises and games are in vogue among the fair sex. It consists of a loose-fitting blouse with sleeves of ample proportions buttoned close at the wrist. At the waist, a belt or sash is worn, and this supports the wide-cut bloomers. Regulation gymnasium stockings and high shoes complete the costume. In many instances, the collars are the only distinction between the players of opposing teams, as the almost universal color of the blouse is dark navy blue. This costume admits of the greatest freedom; the players can go through all the rapid play which basketball demands without the inconvenience that would be occasioned by adhering to less easy-fitting forms of dress. At the same time, the costume is most becoming.

A held ball



ENERGY EXPENDITURE IN ATHLETICS

By Francis Marsh Baldwin, Ph. D.

Tests on players at Southern California furnish a guide to the regulation of strenuous activity

As a sequel to the symposium "How Much Shall We Take" contributed by high school principals in the December Scholastic Coach, and to the report of the Indiana doctors on safeguarding the health of high school athletes, Scholastic Coach presents herewith Dr. Baldwin's account of the experiments he is conducting at the University of Southern California.

THE problem of the degree, the quantity and the direction of energy exchanges in any type of popular athletics is one that must be solved if sane practices are to be established by coaching staffs, and popular support be maintained in these activities. It would seem reasonable to suppose that the coaches of athletics are as anxious to know the truth, and to apply it, as the parents are in their demand that justice be done the boy or girl participant, so that a sufficient reserve in energy be safeguarded for other pursuits.

When energy is allowed to be so freely expended during a workout on a football field, or anywhere else, that the boy returns home "dead tired," and these subjective reports are spread abroad, the cause of competitive athletics suffers as well as the mental peace of the parents and the reputation of the coach. Certainly there are two extreme sides of the question, and those who take the extremes are, without exception, equally subjectively prejudiced. The parent who takes the attitude that his boy should not play in competitive sports because "it takes so much out of him" is as wrong as is the parent or coach who urges too strongly the boy "go in and give all for Alma Mater." Somewhere between these two extremes, the normal, sane American parent joins with the normal, sane American coach and school authorities in support of a program of sport that will provide suitable recreation and physical training for all.

As has been pointed out, the whole picture of physical training is as complicated as is the training for intellectual advancement — and like the systems of education, there are bound to be differences in interpretation and practical application. The solution of physical education problems involves the discovery and manipulation of quantitative factors, just as mathematical problems are dependent upon known factors if a solution is to be reached.

It is a dangerous procedure to generalize until certain fundamental factors become known and can be brought somewhat under control. Among these factors, certainly, comes the question of the rate of energy releases.

FIG. 1—THE DOUGLAS BAG

Technical skill in procedures has been advanced and theoretical concepts evolved to such a point that it is now possible to derive valid data on the expenditure of energy during the performance of any given task. Several procedures to the same end are at hand. Let it be recalled here that oxidations are conceived to take place within the body in a similar way as they proceed outside of it. It is a familiar phenomenon to all that heat evolved from a fire is regulated by the rapidity of the oxidation (degree of the draft) within the fire-box. This principle is taken advantage of in one method of procedure in studying the rate of physiological oxidations. It is called the method of indirect calorimetry. Its validity is established by knowing the volume of oxygen used during any interval of time; the nature of materials burned—in the fire-box simile, whether soft wood, hard, or soft coal, peat, etc., are being burned—in the body, whether proportions or mixtures of carbohydrates, fats, proteins, are consumed; and the calorific equivalent of a given volume of oxygen. The logic of such a procedure is easily followed. Applying this theory in practice, this method makes use of the fact that when 1 liter of oxygen under certain conditions of temperature and pressure is utilized by the body, this volume is capable of burning certain amounts of energy producing materials (metabolites), and in so doing will yield energy in measurable amounts. These relationships in practice on an average dietary mixture are approximately

1 L. $O_2 = 4.85$ "C" of heat energy.

Another procedure involves the principle of catching and quantitatively evaluating the products of combustion, i.e., the respiratory gases, ash, etc. Proceeding in this way it is possible to place a breathing tube in the mouth, collect samples of the respiratory gases in a suitable bag (Douglas Bag—see Fig. 1), and subsequently make analyses of the gases and determine the relative amounts of oxygen, carbon dioxide and water vapor remaining after the physiological burning. The chemist represents a typical reaction by burning a molecule of sugar and noting the volume of oxygen used, the heat evolved, and the volume of carbon dioxide produced. Thus—

$$C_6H_{12}O_6 + 6O_2 = 6CO_2 + 6\,H_2O$$

sugar + oxygen = carbon dioxide + water vapor

The ratio of the volume of carbon dioxide to the oxygen is spoken of as the respiratory quotient: $\frac{CO_2}{O_2} = R.Q.$

Physiologists then work backwards in this method and arrive at an index as to the nature of the materials burned.

Metabolic tests

Oxygen consumed and energy expenditure. Utilizing the first technical procedure just described, a long series of metabolic tests on football athletes at the University of Southern California has been run. Certain interpretations of these data will appear in a forthcoming issue of the *American*

Physical Education Research Quarterly. More recently, data has been accumulated for track and basketball as well, but it is not possible within the limits here to include the latter groups. In all cases, it is first necessary to establish the so-called normal level of metabolism. In the literature this is termed "basal metabolism." It is considered to be that level of oxidation maintained by the tissues in carrying out the usual life processes. This basal level is different in different individuals, dependent upon certain factors, i.e., height, weight, state of excitement, condition of glandular system, etc., but usually it is derived for any individual by reference to metabolic tables in terms of height and weight only. This *normal* is read off in terms of cc. of oxygen consumption per minute of time. An *actual test* is then made, using some type of a metabolic apparatus, where the amount of oxygen consumed over a period of time is measured. This volume of oxygen actually consumed is then computed, and the amount compared with what it should be in terms of the tables. The volume of oxygen above or below the normal amount as cited in the tables is then compared with the normal, and a so-called basal-metabolic rate established for that particular test.

Six varsity players contributed to data compiled in a ten-weeks interval of intensive training for football. Three were selected to serve as controls. One, as it happened, became an all-American backfield man; another an all-Pacific Coast center. The partial protocols of these two will serve us later. Tests were run on the Sanborn Graphic, set up in a room adjoining the training quarters in the gymnasium.

Tests were run regularly in mid-afternoon, just prior to the football practice periods on week days. On Saturdays of the home games, the equipment was moved to the dressing room in the stadium. Each subject, before dressing for scrimmage, weighed in, and then relaxed in a supine position on a comfortable couch for an interval of fifteen minutes while routine matters were carried forward. These preliminary observations included the recording of body temperature, pulse rate, blood-pressure, and subjective reports, as well as the weather conditions, barometric pressure, temperature, etc. All subjects ate at the training table and from our standpoint it is assumed that through the urges of hunger and appetite, the individuals consumed dietaries sufficient in variety and in calorific value to meet the energy expenditure needs.

[Concluded on page 32]

HIGH SCHOOL STUDENTS FULL OF LIFE

Health education transcends the physical; it involves the complete circuit of living

By Thomas D. Wood, M. D.

This is the second of a series of three articles by Dr. Wood on the modern high school's approach to an inclusive program of health education.

THE high school boys and girls today represent as fine a body of future citizens as the world has ever seen,—yes, in some respects the very finest. Has this nation, or any other nation, a more important, more challenging, or more promising privilege or problem than that of helping the youth of today, potential ancestors and citizens, to become as fit, as capable for their great adventures and tasks as it is possible to help them to become? These high school students, with rare exceptions, are intensely interested in complete living without knowing what this really or fully means. They are keenly ready to make their lives fuller, more useful, more satisfying to themselves and to others. This they can accomplish only if their elders know how to help them, and can make such help acceptable. These boys and girls do not know how to do this for themselves any more than they know how to train and coach themselves for their best conditioning, performance, and records in athletics and sports.

These boys and girls, the youth of the land, the hope of the nation, are worth the most careful study, cultivation and development that devoted human interest and scientific skill can give them. On the positive constructive side, this care and cultivation should help them to discover and develop the best of their possibilities; for after all, health education, just like general education, is the process of self-discovery; and while they cannot find themselves unaided in this confused and difficult world without preventable error and destructive injury or waste, still all that their elders and well wishers, parents, teachers, and others can do, is to help them to discover and realize in actual achievement the best of themselves. Incidentally, this should be appreciated not only as the supreme game of life for youth themselves, but also as the greatest adventure and the most thrilling and satisfying program of constructive and creative planning and vicarious accomplishment which their elders can possibly discover for themselves.

On the negative or, better, the reconstructive side of the program, it is of primary importance to discover and correct their health defects and handicaps to the utmost possible. In spite of their superb health potentials, and their general elan, the great majority of these boys and girls are living somewhat or much below the optimum of health, fitness and power of which they are capable. This gap between what they are and what they might be is a gap of which, in most instances, they are ignorant and oblivious. It is also a gap, a chasm, of

which their elders, parents, teachers and others, often and unfortunately have comparatively little understanding, with real appreciation of the actual or potential loss entailed by failure to bridge this gap—loss measured in values expressed in failure in happiness and achievement, in preventable suffering, misery and death, in economic loss, and in social and racial waste. The health needs, then, of these students, and their readiness for better knowledge, attitudes and conduct to improve the lives of themselves and those about them must be brought to light, not only collectively, but individually, if they are to be helped with any real success into progress and accomplishment of which they are splendidly capable.

Standards of personal health

Health must be viewed and accepted as including all the elements, traits and qualities which condition, and contribute to, full, rich, helpful and joyous living. In the words of a national committee report:

"The ideal of health is not mere freedom from obvious defects and disease symptoms. It is the realization of the highest physical, mental and spiritual possibilities of the individual."

There are three ideas or standards of personal health for the individual:

1. **Health ideal**, the ideal of health, the perfect health that one imagines and would like to have. This is never wholly attainable, but it is a fine aim to keep in view and to approach as near as is possible.

2. **Health actual**, the health status at any time. This is often far below the possible and practicable.

3. **Health attainable**, the health that one may have with the knowledge, appreciation and realization of health that are reasonably available for the individual.

The concrete problem of the health program is to bridge or fill the gap between health actual and health attainable. The writer with primary interest always in health and preventive medicine testifies to four decades of professional effort and experience as a physician, in the engineering problems of health bridge building for others, and a lifetime of such effort for himself. On this background the statement is made that nobody can estimate or predict, for a multitude of human beings, particularly those with some forms of important handicaps, how much may be accomplished in health improvement as the result of intelligent, patient and persistent effort. The extent to which the health chasm may be bridged in many instances represents the most notable achievements in human engineering. The lives of a national hero, the late Theodore Roosevelt; of President Roosevelt now in the White House, and of others, testify to the truth of the preceding statements. The extent, further, to which the prediction of unfavorable heredity may be disproven or escaped in some serious forms of handicaps, furnish gratifying contradictions or cheering exceptions to some of the teachings and claims of modern popular and dogmatic authors of eminence. The actual accomplishments in an impressive number of authentic instances approach as near to the miraculous as it is possible for scientifically valid phenomena to attain.

Health education includes all of the experiences in the life of the individual which exert a favorable influence, however subtle, upon knowledge, attitudes and conduct which have constructive relationship and benefit to the health of this individual and of those influenced by him. Health education, then, in the nature of the problem, involves the entire life of the individual, twenty-four hours of the day, seven days of the week, and all the weeks of the year. This inclusive range of experiences occurs for the most part in school, home and community. We are concerned here with the share of the school in this composite of experiences and influences, but we must keep in mind that the best efforts of the school may and will be greatly weakened or perhaps rendered entirely futile unless home and school cooperate intelligently and whole-heartedly in this program, or if the teachings and influences of school and home are nullified by outside forces in the community.

In view of the nature and scope of this problem, it is evident that even in the school, where systematic education is provided, health education is far more than a subject to be taught. It is rather a complete way of living in which the experiences, stimuli and incentives, in appeal to intelligence, emotions and will, gradually determine the ideas, motives and conduct which influence very definitely and sometimes profoundly the health and personality of the individual.

Whole health

We should also constantly keep in mind what health has to do with vital characteristics of body, mind, emotions, the social being and character. These phases or aspects of the individual life are closely related, inseparable and inter-dependent, but it is also true that one phase of this complex human being more or less healthy or unhealthy, may receive more intensive, constructive attention and training while other phases are neglected, sometimes with serious, perhaps harmful results. In some, perhaps in a good many high schools, much attention has been given to physical health, with improvement of food and exercise habits, often resulting in striking increase in strength, vitality, endurance, psychomotor skills, and resistance to some forms of disease. Such improvement in physical health is naturally of great value, in proper balance and relationship. Such physical improvement, however, unless associated in concomitant relationship with development of admirable motivation for the use of improved skill and power in ways socially useful and ethically sound, would be and is unfortunate and perhaps a positive disservice and danger to the individual and society.

A high school student, by improved physical health and power, may be rendered a more effective gangster and criminal unless corresponding education of character provides successful motivation of increased vigor and skill to socially useful ends. Full provision, then, should be made in an adequate, balanced health education, beyond the more personal physical hygiene, for commensurate attention to mental hy-

[Continued on page 25]

COMMON ERRORS IN TENNIS TECHNIQUE

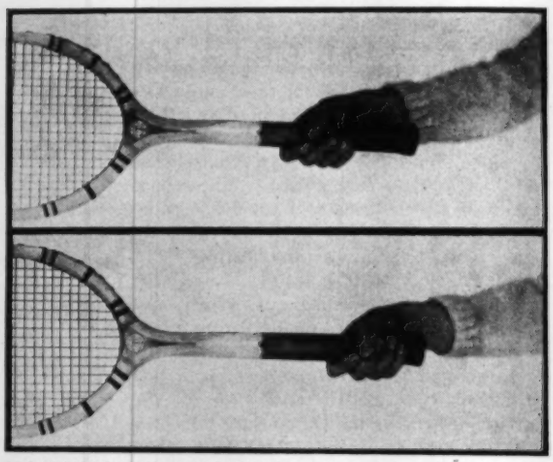
Fifteen causes of retarded progress in most inexperienced tennis players

By Eli Epstein

Mr. Epstein is tennis coach at Hunter College and an instructor in the department of physical education of Morris High School in New York City.

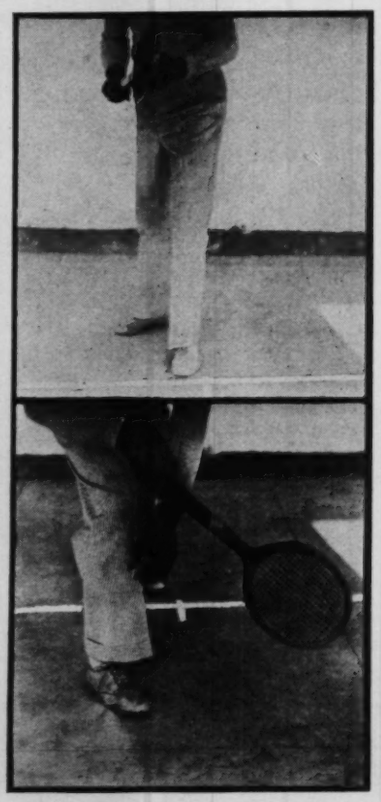
A STUDY of the technique of novice tennis players, and also of players of some experience who may not have had the benefit of proper instruction as beginners, reveals a number of errors more or less common to all.

The high school coach and instructor, whether or not he has the time and the facilities for conducting class instruction in tennis, has numerous opportunities for assisting student tennis players in their efforts to become better at the game. Young tennis players, regardless of their ability, are usually keen on talking about the game, and will lend a willing ear to any member of the school faculty who has something to contribute to the students' enjoyment of the game. This is not to imply that tennis can be taught conversationally. But where the coach has not the time to give in actual class work with the tennis players he will want to capitalize his opportunities for using other means of arousing and maintaining student interest in a sport as enduring as tennis. The school bulletin board is often used effectively in giving the entire student body an opportunity to share in whatever instruction can be presented in this way, such as photographs of the various strokes and tips on playing the game, some of which are given here in the form of a list of errors apt to occur in tennis stroking.



BEGINNERS USUALLY LIGHTEN THE LOAD BY CHOKING THE RACQUET (ABOVE) BUT IT IS RECOMMENDED THAT THEY GRIP IT AT THE END FROM THE OUTSET (BELOW).

THE SERVER SHOULD BRING HIS REAR FOOT INTO THE COURT AFTER CONTACT



1. **Grip:** Beginners, with wrists unconditioned to controlling an implement of the weight and size of a tennis racquet, usually lighten the load by choking the racquet. It is recommended that they be encouraged to take the proper grip at the end of the handle from the very outset, with the wrist slightly lower and fingers spread wider than shown in the accompanying illustration.

2. **Stance:** While awaiting service and other balls to come across the net, the player should not stand with feet too close together, or too wide apart. To do so places too much of a restriction on the freedom of the stroke and fullness of the follow through. The length of the player's legs determines the width of his stance. Usually the best stance for a player is as wide as about two of his own foot-lengths.

3. **Contact:** Making contact with the ball too far forward or too far back deprives the stroke of proper timing, and sends the ball off the racquet under poor control. The best contact point between racquet and ball is a point under the right eye with the head turned slightly forward, as it naturally would be. The distance out from the body should be the length of the natural racquet-arm extension, with a slight bend in the elbow.

4. **Weight distribution:** Carrying the weight on the heels, or equally distributed between heel and ball of the foot, handicaps the player in his spring and quick response to a stroke. It is of prime importance to carry the weight on the balls of the feet in order to be instantly prepared to carry out whatever movement the next ball calls for.

5. **Shift of weight:** To retain the weight on the rear foot in stroking deprives the stroke of pace and length. The weight should be taken on the rear foot as the racquet goes back to be "cocked" for the stroke, and shifted to the front foot as the racquet is brought forward and struck against the ball and followed through. Well-timed shifting of the weight also contributes to the smoothness of the backswing and forward stroke of the racquet.

6. **Server's position:** The server who stands at a distance from the middle of the base line (where a small mark should be made on the base line, bisecting it) leaves too much of the court open into which the opponent can place the return of service. The base of all good servers is near the bisecting line of the base line.

7. **Server's foot action:** The failure to move the right foot (for right-handed players) into the court immediately after the follow-through of the service, handicaps the server in recovering his balance in case of a quick return of his service. Let the rear foot follow across the baseline and into the court after contact.

8. **Server's first ball:** The first ball should not be a "throw away." It should not be so uncontrolled that its chances of being good are rare. The first service should, of course, carry more risk than the second, especially in the matter of speed. But the speed should not be so great as to place it out of the server's control. The second ball should depend chiefly on twist for its control.

9. **Low volleys:** Volleying a ball that is just a few inches above the ground

deprives the stroke of most of its attacking power. The low volley should be used only when it is impossible to play the ball off the ground. Low volleying is purely defensive, and is rarely effective even as good defense. The upward swing of the racquet required in handling a low volley results in a "pop up" return. Volleying is most effective when the stroke can be made horizontally or downward.

10. **Chop stroke:** Players who build their entire game around a chop stroke are adopting a game that can never equal the speed and power of a driving game. Flat-racquet drives, forehand and backhand, should form the foundation of a sound game, with chops, slices and excessive top spins and side spins, added for variety and deception.

11. **Half smashes:** When it is decided to smash the ball, let the racquet go right through to a full follow-through. Do not check the stroke when smashing. Abortive smashing is the cause of more errors in handling high balls than anything else.

12. **Smashing stance:** A wide stance in smashing, and failure to turn the body so as to bring shoulder line at right angles to the net, are serious handicaps to successful smashing of high balls. Narrow the stance way down, and "square off" by turning the racquet shoulder back, when going for smashes.

13. **Smashing position:** The cause of many smashes being netted is the failure of the player to get under the ball in time if he has to retreat for it. It is common for beginners, at the moment of smashing, to be moving away from the net. Get under the ball in time to allow for a shifting of the weight forward and into the smash.

14. **Lobs:** Insufficient height and distance render lobs ineffective. A lob can be both a defensive and offensive weapon at one and the same time. It is most effective in breaking up a net attack, but to do so the ball must be returned high and deep so that it will fall deep in the opponent's court, near his base line.

15. **Position play:** The most dangerous position to occupy on the court is in the mid-court, around the service line. When it is necessary to come into this "no man's land" to make a return, move quickly to the net (if your shot has forced your opponent into a defensive position) or to the base line (if your shot has lacked attack).

TENNIS TROPHY

High Schools desiring the *Scholastic* National Trophy for winners of each school's intramural tennis tournament should fill out the coupon on page 32.

NEWS, NOTIONS & NONSENSE

From the office of the National Federation of State High School Athletic Associations

SOME years ago the National Federation of State High School Athletic Associations initiated a system of sanctioning interstate meets to the end that high school men who were proposing to transport their athletes across state lines might have some notion as to the kind of competition they would be likely to get into. In general, to secure national sanction, interstate meets, with the exception of interstate basketball tournaments, have needed only the approval of the officers of the local state high school athletic association. Thus the so-called National Track and Field Meet which has been conducted at Chicago for a number of years has always been sanctioned by the National Federation on the basis of the certification by the officers of the Illinois High School Athletic Association that the meet would be properly conducted and that it was deserving of the support of high school men throughout the country.

There have always been certain limitations placed upon these meets by the executive committee of the National Federation. One restriction is that only schools that are members in good standing of their respective state high school athletic associations may participate in any sanctioned meet. Another is that in case the officers of any state athletic association petition the manager of the meet not to invite schools from their state the manager is obligated to refrain from issuing such invitations.

Recently the Penn Athletic Club of Philadelphia, Pennsylvania, was granted a National Federation sanction for a swimming meet upon the recommendation of the executive secretary of the Pennsylvania association. The Penn Athletic Club advertised the fact that it had been sanctioned by the National Federation. Somewhat later, however, undoubtedly feeling more or less restive under the limitations imposed by the sanction, the Penn A. C. returned the sanction with the statement that they preferred to proceed independent of the National Federation and conduct the meet without the sanction. This means, of course, that schools from our member states are prohibited by the National Federation rules from attending the meet.

The manager of this meet in returning the sanction complained about the restrictions imposed. According to his theory the meet ought to be open absolutely to all interscholastic entrants of certified scholastic standing and under the age limit. He stated that the chief objective of the meet was to encourage competitive swimming with the Olympics particularly in mind. Pursuant to his ideal, he has issued a nation-wide invitation to high school pupils to attend his meet in defiance of their local organizations. We have no doubt he will have a reasonably well-attended meet in spite of the fact that it is an unsanctioned meet. There are still plenty of people in the United States who believe that even athletics for school children ought to be conducted of the sports, by the sports and for the sports. As a matter of fact, we wonder about his imposition of the two limitations suggested above. If we are looking forward to American prestige in the Olympic games, why bother about scholarship?

■

This raises the question at once as to whether or not our high schools and our high school athletic associations as organizations should interest themselves primarily in the promotion of any kind of athletic achievements for the sake of some great show such as the international Olympic games. The editor of this page is perfectly free to say that he has no interest whatever in that type of competition. Our high schools have a perfectly definite and immediate educational objective. All of our athletic energies ought to be bent in the direction of achieving that objective. After these boys have reached the maturity of college students we should consider that it would not be out of place to give them specific training with some of these great international fetes in mind.

If the writer's conception of the purposes of high school athletics is correct, then there is no justification

whatever for non-educational organizations such as athletic clubs, newspapers, commercial organizations and other groups interested chiefly in P P P (Prestige, Publicity, Profit) to enter the field of high school athletics. We believe it would be a forward step on the part of the National Federation to instruct its executive committee not to sanction any inter-state meet for high school boys conducted by any non-educational institution or organization.

Not only that, but possibly after that, there will need to be some explanation as to why colleges and universities should enter this field particularly in view of the fact that the high school organizations themselves are now offering a comprehensive program of athletics for boys which, if it can be criticized at all, should probably be criticized for its rather excessive magnitude.

Will football return?

THERE seems to be a lot of discussion in the daily press, and among coaches wherever two or three are gathered together, relative to the problem of the so-called "return" of football. Now to the casual observer the question might arise as to why football should ever have been considered to be "away." Is not the primary function of football to develop character? And has the opportunity for developing character been absent from the football field and the great stadia which have been constructed throughout the country at such enormous expense? As a matter of fact, this whole discussion as to the return of football rather gives away the entire argument about the building of men or the development of character. For it is perfectly clear and definite that what our newspaper writers and football coaches mean by the return of football is the return of the "big gate." It has apparently been discovered that it takes a lot of money to develop character. And those proponents of football whose prosperity is dependent in large measure upon the enormous gate receipts of a few years ago have been tremendously disturbed at the falling off in those receipts.

■

We have been hoping that the time might come when the proponents of football would give up the tiresome cant about building men and developing character and admit freely that the great spectacles which have been developed under the name of interscholastic football are staged for the purpose of making money. Certainly there is nothing dishonorable about making

money provided it is done in a legitimate way. We heard an outstanding football coach make the statement that "We football coaches are in the biggest show business in the United States." Why not recognize that fact and be done with it?

It is the belief of this writer that in spite of certain extravagances in expenditures which most college men would probably admit, yet in general the tremendous receipts from intercollegiate football have been well spent. We could name one great university of which we are very proud indeed that has built up from its football receipts one of the finest physical education plants in the world. This plant makes a tremendous contribution to the education of youth throughout an entire populous commonwealth. We would venture the assertion that at this particular university the football receipts have been more economically spent and more meticulously accounted for than are ninety percent of the appropriations of our state legislatures.

WE are looking forward to the day when university presidents and directors of athletics and football coaches will come right out in the open and say that the thing they are after in intercollegiate football is one hundred thousand or five hundred thousand dollars per year which they will spend in a most constructive way for the promotion of the welfare of American youth.

From this purely commercial viewpoint the writer does not hesitate one moment to say that football will come back and it will come back strong. Just as soon as men and women have money to spend on entertainment they will spend some of it on football games. And this is not because of any chimerical or fantastic notion about developing character or building men. It will be simply because intercollegiate football today furnishes just about the best show that is furnished by any of our professional systems of entertainment. We are all hopeful of a returning prosperity and think we begin to see signs of it in our social organization. The proponents of commercialized football need have no fears about the return of the big gate. If our economic system will only put a little money in our pockets we will all be there to see the big show which is generally recognized to be one of the cleanest, most wholesome and most interesting types of entertainment available to the American public today.

C. W. WHITTEN
Secretary,
N.F.S.H.S.A.A.

Full of Life

[Continued from page 19]

giene, social hygiene, safety education, public health, industrial hygiene and character education.

It must be apparent that, because of the wide range and variety of impressions, learnings and responses in such a program, education for health must go far beyond a regular course in health, hygiene, or under any other title, which may be scheduled for one or more class periods a week, for a semester or a year. However, such a course is usually essential in the present type of high school curriculum, in addition to other educational procedures relating to health.

Fitted into the program

The advantageous types of experiences in a comprehensive health education program in high school may be briefly listed as follows:

1. A course or courses dealing directly with health, conducted as required or elective courses during one or more semesters or years. At least one fundamental course should be a "constant," required of all students, to meet the more universal needs. Advanced and more technical or specialized health courses are offered successfully as elective units in at least a few high schools.

2. There are combination courses with other subjects in which health or hygiene has a definite place and substantial share in subject matter and instruction. Illustrating this plan of correlation are class programs and text or reference books in biology, general science, home economics, social studies and other subjects which are progressively giving more space and tim to various aspects of health.

Keeping clearly in mind that health education is vitally concerned with all the experiences and situations in school which have a bearing upon health, we shall make more incisive and helpful use of terms if the systematic courses just referred to are called *health instruction*, in providing the more formal, systematic teaching for health, while the more incidental episodes are recognized as informal though often significant experiences in the health education program. These, however, deserve as skillful, sagacious treatment as the more formal health instruction, since very often the incidental experience makes the most powerful impress upon the student.

3. To be given a definite place, also, are the applications to health in other subjects and courses in the curriculum. Every subject of study in the high school presents opportunity often unanticipated, for incidental health teaching, for the teacher who is sensitively appreciative of such opportunities, and skillful in using these with success.

4. In the health examinations, in emergencies involving accident or illness, or in personal conference anywhere, the physician, nurse, dentist, teacher of physical education, the social guidance officer, the principal of the school or other member of the staff, finds a chance, often of a most telling kind, for individual health education.

5. The work of the athletic coach with groups and individuals, furnishes in many instances the most dynamic and gripping chance of all to stamp an influence, frequently dramatic and far-reaching not only upon physique, but upon personality and character. High school youth are, in general, intensely interested in athletic sports. They will go to great effort to do their best in their games. For an impressive majority of the high school adolescents no goals and objectives appear to them more desirable and compelling than (a) to get into good condition and be most fit for efforts and accomplishments of paramount worth to them, (b) to achieve sportsmanship by making notable contributions to the success of team, class or other group, and thus to gain favorable recognition and attendant satisfactions. Here we have personal and social motives of great importance in health education. With few exceptions the students are ready, with great respect and keen eagerness, to follow the instruction and advice of the coach with reference to training rules and the health schedule, as well as to game skills and rules. For a considerable percentage of these students, the successful coach wins a place of dominant influence with reference to questions and decisions far removed from athletics. The distinctive value of the contribution which may be made by the coach in the health education of high school youth can hardly be exaggerated.

The president of an eastern university expressed his conviction some years ago that no member of a faculty had a greater influence upon the health and morale of students than the teacher of physical education or the athletic coach. However, to live up to this high privilege and responsibility, it is essential that the coach, in addition to a personality of admirable example, should possess adequate scientific understanding and educational ability in physical, mental and social health to meet successfully the personal and group needs which present themselves.

6. It should now be apparent, on the background of these experiences thus briefly presented, that a program of health education in high school, to be really complete, must enlist the active interest and practical co-operation of all members of the faculty and staff. Nor is this idea or possibility a figment of the imagination. In a recent visit to a progressive high school in Massachusetts, the writer learned at first hand about a teachers' health coun-

cil which has been in operation for several years. Every subject and department in the school is represented by an active member in the council. The chairman, not a full time health worker, gives, however, as much time and attention as the health council program requires. Constructive consideration is given to the health needs of individual students as these appear. To meet the human needs which occur, the council seeks and receives the help of physicians, nurses, parents and others, as well as health authorities and other official and voluntary agencies in the city and state.

One cannot escape the conclusion, then, that if this high school health program is to be really efficient and free from important flaws and shortages, every teacher must be a health teacher, and every teacher must be a health example. The old saying has greater significance and force in health education, with an inclusive connotation of this term, than in any other phase of the curriculum, that "What you *are* speaks more loudly than what you *say.*" The power of personal example, supplementing any attempt at teaching by precept or otherwise, applies also with peculiar force to the influence of the home.

Some changing ideas regarding subject matter, teaching methods, organization and administration, require careful understanding and practical attention. While courses dealing exclusively in definite part with health are still requisite in an up-to-date general high school curriculum, it is every day more clearly apparent to those whose mental vision is at all adequate that health education, to be of any real practical use, must be individual in character to meet the actual personal needs of students. Remembering the categories which belong to health, it must be evident on brief consideration that high school students present to those who can see a far greater range of individual differences and needs in relation to health than to any other subject in the curriculum.

The health education program should be determined partly by best available evidence of the knowledge, attitudes and habits regarding personal and community health of these students at the start, and partly by the report of the health examination and the health record of the student which the school should have on file for this purpose. There must also be carefully planned coordination and supervision of the more systematic health instruction, the more informal range of correlations with health, and the individual guidance and counseling regarding health, by any and all who may come into the game.

Those who cooperate with greatest efficiency in this health program of the high school must have a mental picture and a scientifically sound understanding of the health which is really fullness of life, in order to give the most efficient help to each student, to realize the splendid best in joyous health and joy-giving personality of which each boy and girl is capable.

What is involved in this picture of the fullness of life which measures attainable health, possible with all the conditioning factors, to each individual?

*Dr. Wood will tell what is involved in his final article of the series in the April Scholastic Coach.

Shot-Putting

[Continued from page 9]

The Follow-through—The reverse is a part of this follow-through. I said that the left foot remains in contact with the ground till the shot actually leaves the hand (some of the European putters do not use a reverse at all). by this time, however, the right foot is off the ground, the body is leaning forward, the putting arm is outstretched to its limit. The putter puts everything he has into that terrific shove of the shot, driving viciously off the right foot, then with the left, as the center of gravity passes forward, following after the shot with all the weight and speed at his command. He does not follow *to* the stopboard—he follows *over* it—way *beyond* it. He reaches three feet out over that board after that shot, keeping his hand in contact with the ball just as long as he possibly can—which simply means that he is putting all his weight behind the put. That right arm finishes up in the air *in line with the flight of the shot*, not across to the left. If all the power the putter has is applied directly behind the shot, the arm must travel in a direct line behind that shot. Note in Illustration No. 1 how Rothert, Sexton, and Torrance have that arm outstretched *toward* the shot. When they finish, their right arms actually drop to the right side of the body. That is *shot-putting*. The gentleman from Europe, shown in Illustration No. 6, has no idea of his physics. His power has been applied obliquely—across the line of flight of the shot. He was one of the best representatives of a really athletic nation—and he put the shot nearly 47 feet! It took me over two years to break Dues of this fault. I finally used a vaulting standard just in front of the stopboard which his hand would hit if he rotated to the left—and he stopped it—and raised his mark over three feet.

The eyes of all good putters follow the flight of the shot—the head is kept up, pointed toward the shot—never allowed to turn away from it from the start of the put till the shot lands. To turn the face away to the left is fatal.

For beginners

For beginners, let me just mention something we have found to be very useful. Practice continually shoving the shot but from standing position without reversing at all. If the arm cuts across to the left, try this—have the boy stand partially facing a solid upright post of some sort (an upright of the tackling-dummy rack will do). Have him place his left hand flat against the post, face-high, with the body in putting position. Now he pushes the shot out past that post as far as he can. It will cure him of many faults—left-sweep of the arm, excessive hip-pivoting, too quick turning of the body to the left, turning of the head to the left, falling away of the body to the left, taking eyes off the flight of the shot. And it will develop some powerful pushing muscles.

How high should the shot be aimed? Personally, I think that many aim it too high. The best puts I have ever seen the good men make have been of the so-called low variety—about 35 degrees—maybe 40. I believe that 45 is too high. I have seen some magnificent puts at about a 30-degree angle—puts that traveled like a bullet. Remember, *speed* is the only thing that will keep the shot up—the shot has to *travel*. It is more difficult to put this maximum speed into high puts.

Why can't the beginner get distance? In the first place, he is, ordinarily, not strong enough—certain muscles are really not developed. His fingers and wrist are comparatively weak, as a rule. Then, he naturally throws the shot instead of putting it. He also allows the shot to pull *him* almost as far as he puts it. His body falls away from it. He has no idea of timing. His muscles do not coordinate in the effort. He has no snap. Months and months of chinning, dipping, climbing ropes, together with starting, and sprinting, will help him develop the prerequisites of successful putting.

Electro-Therapy

[Continued from page 13]

Ray therapy—infra-red, ultra-violet

The so-called white light produced by the sun consists of a mixture of colored rays. When a sun beam passes through a prism the rays separate and form a spectrum. The lower part of the spectrum is made of the red and the upper of the violet rays.

Besides this visible spectrum there is also an invisible one. The area below the red part is called the infra-red and the area above the violet part is called the ultra-violet. Neither of these areas can be seen with the naked eye, but their existence can easily be proved through their action. The infra-red rays produce a marked heating effect and the ultra-violet rays possess a powerful chemical action.

Since the effect of these rays is so different, machines have been devised to produce only a desired kind of rays. Due to practical difficulties of construction the machines commonly used produce neither pure infra-red nor pure ultra-violet rays, although the desired rays predominate.

Infra-red rays

The principle of the construction of the apparatus—In order to produce the infra-red or heat rays the electric current is sent through a substance which has a great resistance. The apparatus (commonly known as "baking lamps") consists either of an incandescent lamp with a carbon filament or a heating element made of a silicon-carbon composition.

Physiological effect of the infra-red rays—Since the infra-red rays represent radiant heat, their action in the main is the same as that of heat produced in any other way. The general effect is sedative, restorative and eliminative. The local effect is an increase in circulation, a relaxation of the tissues and a relief of pain.

The penetrative power of these rays is far greater than that of the ultra-violet rays. They reach the region below the sweat glands of the skin.

Cases in which the infra-red rays are used—They can be used with success in any type of athletic injury: bursitis, arthritis, sprain, strain, charley horse, etc.

Contra-indications—They should not be used if there is a tendency to bleeding, or in the presence of pus pockets.

Apparatus used—A simple apparatus consisting of an electric bulb with a carbon filament, a metal reflector and an adjustable stand may be purchased for a couple of dollars. A better apparatus suitable for the majority of the cases will cost about twelve dollars. Powerful machines which can be used for the irradiation of big areas cost from fifty to two hundred dollars.

Ultra-violet rays

Principle of the construction of the apparatus—Carbon, tungsten or mercury is heated by an electric current to such an extent that they emit the ultra-violet and the other rays in various degrees.

Physiological effect of the ultra-violet rays—Although the literature dealing with ultra-violet therapy is large, a precise explanation of the action is known only in a few instances. A certain degree of confusion results from the fact that many experiments have been made on healthy subjects the results of which were different from those obtained in the case of the sick subjects.

One thing that is definitely known is that the effect of the ultra-violet rays depends upon their power to bring about certain chemical changes.

The local effect: The ultra-violet rays produce erythema of the skin, cause pigmentation of the skin, activate a certain substance called ergosterol always present in the skin, and convert it into vitamin D; hinder the growth of the germs and fungi and even kill them under favorable conditions.

The general effect: The production of vitamin D cures rickets. General health conditions tend to improve. The direct effect upon anemia and prevention of cold is still doubtful.

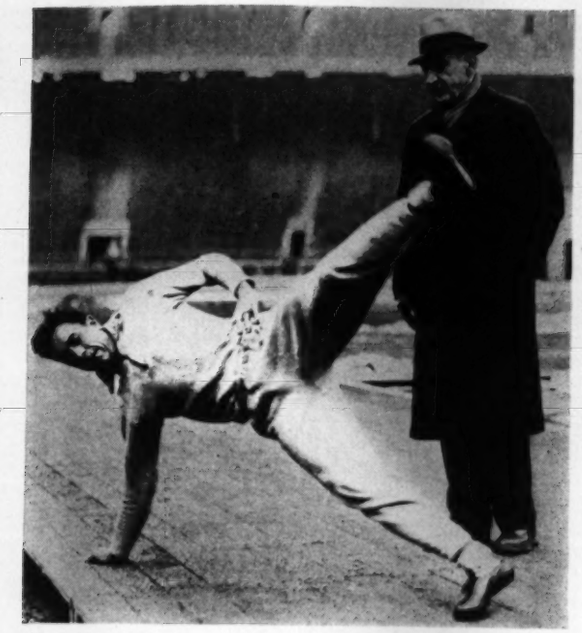
Precautions—An intensive irradiation with the ultra-violet rays causes burns. If the person treated does not wear goggles, inflammation of the eyes may result, causing a temporary partial blindness, from which he will recover in a few days. Excess irradiation will produce a feeling of fatigue and malaise.

Cases in which ultra-violet rays are used in department of athletics—Synovitis, wounds, burns, fractures, acne, eczema, impetigo, ringworms, plantar warts. In cases of hypochondria where students worry without any apparent reason this treatment produces a remarkable result, probably through a psychological effect.

Although the practical aim of the treatment is to produce a faint erythema of the skin, nevertheless a curative effect may be produced without even the first degree of redness. Maintained erythema is not a sign of improvement. One should also remember that the action of the ultra-violet rays is proportional to the square of the distance of the treated area from the source of radiation. If the distance is cut in two, the effect will be intensified four times.

Apparatus used—Carbon arc produces a spectrum similar to that of the sun. The disadvantage of the arc is that it produces too much heat. The tungsten arc produces more ultra-violet rays than the carbon arc but the output of the other rays is less. The most common apparatus in this country has mercury as a source of radiation. Mercury is put into a tube made of a fused quartz, from which the air has been exhausted. On heating, the mercury vapours are formed which carry an electric current through the tube and emit ultra-violet rays. At the present time there are many types of lamps producing ultra-violet rays. Wherever possible it pays to have a powerful lamp. The prices range from one hundred and fifty to five hundred dollars.

For Your Bulletin Board



Acme

ABOVE—THE FIRST STRETCH OF THE OUTDOOR SEASON: Gene Venzke, Univ. of Pennsylvania and Olympic miler, and national indoor record holder, limbering up under the eyes of his coach, Lawson Robertson, at Franklin Field, Philadelphia.

Keystone

ABOVE—A BOAT THAT GOES NOWHERE: The Columbia Univ. crew pulling their perforated oars through the waters of the City of New York, during a workout in the new outdoor tank especially constructed for pre-season winter training.

Wide World

RIGHT—A MACHINE FOR IMPARTING COORDINATION OF MOVEMENT BETWEEN ARM ACTION AND LEG ACTION IN THE CRAWL STROKE: Al Kallunki, swimming coach of Oakland, Calif., giving a student a lesson on a machine which causes the legs to move in eight-beat rhythm to each complete turn of the handles.

Acme

LEFT—NET RESULT—HEALTH: A student at Southern California in a flash of action just after playing the ball in a volleyball practise session.

RIGHT—MOUNTAIN SNOW FOR A SKI CONTEST IN BERKELEY, CALIFORNIA: Roy Mikkelsen, national ski jump champion, taking off from a slide surfaced with snow brought down from the High Sierras.

Acme

The Play of the Year

THE sequence of moving pictures to the right shows the Columbia team scoring with "the only unsound play in its repertory" against Stanford in the 1934 Rose Bowl Game.

The play was properly the climax of the build-up of spinner plays, all similar in appearance, which were diagrammed in the February Scholastic Coach by Stanley Woodward, who saw the game. The moving pictures of the scoring play bring out several interesting points not shown in diagram.

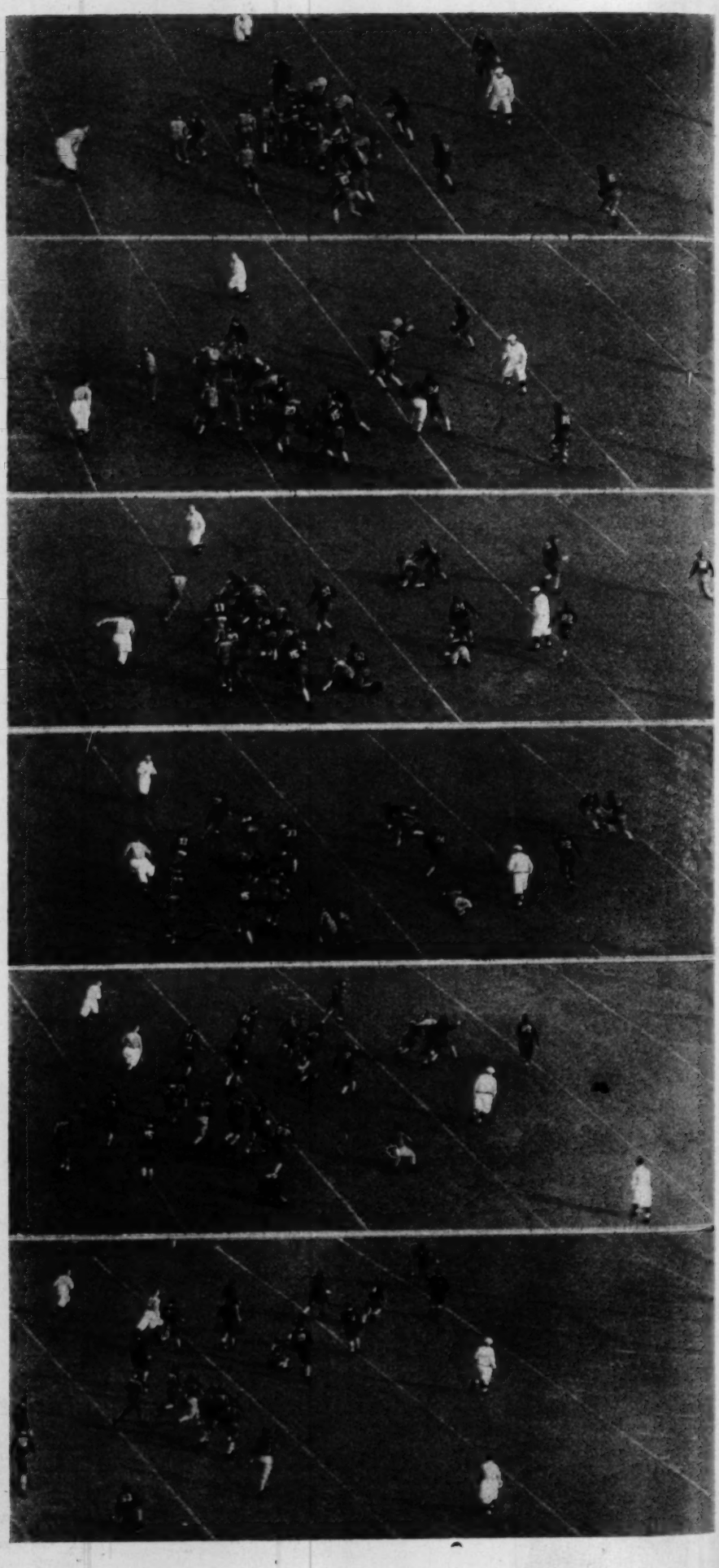
One of these is the action by and on the Stanford right end (Smith, No. 20). The Columbia build-up of spinners in which the ball carrier never went outside the defensive right end, apparently has had its effect on him. He did not smash across the scrimmage line, but he has been drawn inside. The picture shows that he actually was hit by a Columbia blocker. The diagram did not show this. Had he not been hit the picture indicates that he might have been able to reach the ball-carrier.

The movement of the Stanford center backing up the line (No. 33, Muller) reveals that he was never touched by a Columbia blocker. It is clear that he was deceived by the play, because he did not turn to his right until the ball carrier (Barabas, No. 28) was well under steam.

The Stanford right halfback (Hamilton) is seen in a maneuver which many coaches will regard as a mistake on Hamilton's part. As the Columbia left end (McDowell) goes through to block him, Hamilton succeeds in warding off the block and remaining on his feet and, apparently, in good command of his movements. Yet he passes on the inside of McDowell, rather than on the outside, even when it appears clear by this time that the play is all out to his right. One must not be too critical of Hamilton's movement, however, for he may have had no choice: McDowell may have "frogged" over to keep Hamilton on the inside.

One other interesting feature of the play in operation is seen in the way the Stanford right tackle (Callaway, No. 11) was passed by and never touched. He came straight through and would have been right had the play been one of two of the build-up plays.

The photograph below shows the forward-pass play, with its splendid protection for the passer (Montgomery), by which Columbia advanced the ball from the 41-yard line to the 17-yard line.



Rules Changes

[Continued from page 5]

the N.C.A.A. Football Rules Committee meeting in Atlanta last month, are:

1. Elimination of the five-yard penalty for a second, third or fourth illegal or incomplete forward pass.

2. Treating of the first incomplete forward pass over the goal line—except on fourth down—just as though it had become incomplete in the field of play.

3. Changing of the definition of the punt so as to permit the kicking of the ball from the hand or hands of a teammate.

These changes all aid the offense at the expense of the defense. The party of the first part is the one that needed assistance and we are glad that it got it. Now the offense can forward pass to its heart's content into the end zone.

Commenting on the elimination of the five-yard penalty for incomplete forward passes in succession, Lou Little, the Columbia coach and counsel to the rules committee, said:

"I feel that it was a great thing to get rid of that five-yard forward pass penalty. It did not serve its purpose, which was to stop indiscriminate forward passing. The fact is it often made it necessary for teams to pass.

"For instance, suppose it is third down and you have had one penalty of five yards. What do you do? You have to pass or kick and the defense knows it. It will loosen up, granting you a few yards on a running play, but make sure to prevent the completion of a pass.

"Suppose the same thing occurs under the new rule. You are not penalized for making a second incomplete pass. You get to third down with comparatively small yardage to gain. The defense suspects that the play will be a pass but can't be absolutely sure. It can't afford to take anything for granted."

High school rules

THE Football Rules Committee of the National Federation of State High School Athletic Associations met on February 24th, too late for reporting in this issue* what changes will appear in the Official Interscholastic Rules. The high school rules will, our secret service advises us, be kept in tune with the N.C.A.A. rules where the Committee feels that the element of safety, from the high school point of view, remains the same. The Federation also does not want to do anything to discourage State Associations that have not yet adopted the Federation rules from doing so.

While no secondary school representatives have voting membership in the N.C.A.A. Football Rules Committee, there is a Coaches' Advisory Committee which includes twenty-three college coaches, three high school coaches and two private prep school coaches. The high school coaches, however, are not representatives of the National Federation. They sit as individuals, invited by Chairman Lou Little, as a gesture of cooperation with the high schools. The gesture is misplaced, but it is the best that the Coaches' Committee, which has no voting strength on the N.C.A.A. Football Rules Committee, could do, for it is well known that the National Federation does not want advisory membership.

*See the April Scholastic Coach for a full report of the National Federation Football Rules Committee meeting.

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NAME.....

POSITION.....SCHOOL.....
(Principal, coach, athletic director, physical director)

SCHOOL ADDRESS.....

CITY.....STATE.....

Energy

[Continued from page 17]

After valid establishment of *actual* as compared to *basal* levels on all subjects, routine procedures accumulated a tremendous amount of data from week to week, but it is necessary here to cite only typical protocols and give quantitative deductions.

Two protocols follow, since by comparison these data fall well within the limits of human power.

Protocol I. Stanley Williamson, age 22; all-Pacific Coast center, '31; Height 72.5 inches; Weight (ave.) 191 lbs.; total records taken 46; number of Basal records 11; number of Actual Active records 35; deviation of Actual Basals from Normal Basals 0.03 percent; Actual Basal rate of oxygen consumed per minute 260cc.; Rate of Actual oxygen consumption immediately following typical game 646cc.; Actual increase over Active Basal Rate 134 percent; Calorific equivalent, 3 cal. per minute; Total energy expenditure, 15 cal. per minute; (Thermal equivalent of work figured at 20 percent of total).

Protocol II. Gaius Shaver, age 21; all-American quarterback, '31; Height 71 inches; Weight (ave.) 190 lbs.; total records taken 32; number of Actual Basals 14; Actual Active records 18; deviation of Actual Basals from the Normal Basals 7 percent; Actual Basal oxygen consumed per minute 282cc.; rate of Actual oxygen consumption per minute immediately following typical game 765cc.; Actual increase over Active Basal 181 percent; Calorific equivalent, 3.5 cal. per minute; Total energy expenditure, 17.5 cal. per minute.

Summary

When we compare these two athletes their records show very excellent agreement. If we are justified in assuming that these data fall within the limits of experimental error, football is a strenuous game. If we place the total expenditure of heat energy somewhere between 15 and 18 calories per minute, this would amount to approximately 900 calories per hour. Should the system be called upon to deliver this quantity of energy for any considerable time, it is easily seen that the demand would be altogether excessive. In three hours of strenuous work the expenditure would easily exceed 2000 calories. The normal energy expenditure of a school boy over a period of twenty-four hours is 2500 calories. To require an expenditure of 4500 calories would throw an unduly heavy burden upon the system of such immature persons.